



Lake County
Single Occupancy Vehicle
Reduction Study

Existing and Future Conditions

May 2020

draft

Prepared for:

Lake County Division of Transportation

Prepared by:

AECOM
303 East Wacker Drive, Suite 1400
Chicago, IL 60601
aecom.com

In association with:

Metro Strategies, Inc.
Joseph P. Schwieterman Analytics, Inc.

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Abbreviations / Acronyms

AADT	Annual Average Daily Traffic
ACS	American Community Survey
CP	Canadian Pacific Railway
CTPP	Census Transportation Planning Products
CMAP	Chicago Metropolitan Agency for Planning
ISTHA	Illinois State Toll Highway Authority
IDOT	Illinois Department of Transportation
ITS	Intelligent Transportation System
LCDOT	Lake County Division of Transportation
LEHD	Longitudinal Employer-Houshold Dynamics
LODES	Longitudinal Origin-Destination Employment Statistics
LRTP	Long Range Transportation Plan
MD-N	Metra Milwaukee District North
NCS	Metra North Central Service
RGTP	Regional Greenways and Trails Plan
RTA	Regional Transportation Authority
SOV	Single Occupancy Vehicle
STAR	Suburban Transit Access Route
TMA	Transportation Management Association
TOD	Transit-Oriented Development
UP-N	Metra Union Pacific North
UP-NW	Metra Union Pacific Northwest
VMT	Vehicle Miles of Travel

1 SOV REDUCTION STUDY BACKGROUND

Lake County is one of five collar counties of Cook County that make up the metropolitan area of Chicago. Lake County is north of Chicago along Lake Michigan and forms the northern boundary with Wisconsin. The County's development patterns include rural communities, highly developed urban centers, and tourist destinations. Lake County's transportation network is made up of roads, railways, bridges, bike paths, and other components. Transportation providers include the State of Illinois, Lake County, 52 municipalities, 15 township road districts, Illinois Tollway, Metra commuter rail, and Pace Suburban Bus. Figure 1-1 provides a general map of Lake County and the surrounding region.

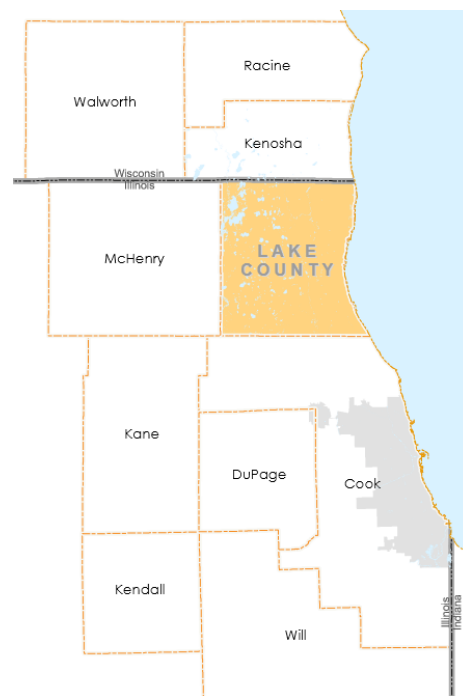
As is the case with most suburban areas of large metropolitan regions, Lake County's dominant travel mode is the automobile. Since most miles traveled in the County are in a vehicle operated by a single person, or Single Occupancy Vehicles (SOV), the Lake County Division of Transportation (LCDOT) proposed this study to investigate potential ways to reduce SOV travel to reduce congestion and environmental impacts from vehicle emissions.

The Census Bureau collects data on the means of travel to work, which provides perspective on the level of SOV travel in Lake County. This was obtained through a sample of the decennial Censuses up to and including the 2000 Census, and thereafter has been collected as part of the American Community Survey (ACS). The ACS combines journey to work data into 5-year periods to improve the confidence of the sampling. Data can be summarized by residence geography or employment geography.

Table 1-1 summarizes the number of workers who drive alone as the primary mode of transportation to work between 1990 and 2016, subdivided by workers who reside in the County and workers employed in the County (note that there is substantial overlap due to the large share of workers who both reside and work in Lake County).

The table indicates that Lake County residents, regardless of work location, who drove alone grew 34 percent between 1990 and 2016. As a proportion of total work travel, the SOV share for County residents increased 2.8 percent to reach its highest level, 77.2 percent, for the most recent period. For Lake County workers, regardless of home location, SOV travel grew 59 percent from 1990, and the SOV share of all modes increased by 5.2 percent to reach 80.2 percent. This data clearly shows that SOV use for work travel is the dominant transportation mode and has increased over time—both in absolute terms, as the local economy and population grew and prospered, and proportionally.

Figure 1-1. Lake County and Region



Source: CMAP.

Table 1-1. Lake County Drive Alone Work Travel over Time

Year	Place of Residence		Place of Work	
	Workers who Drive Alone	% of all Workers	Workers who Drive Alone	% of all Workers
1990	200,994	74.4%	183,853	75.0%
2000	242,361	76.3%	254,995	78.2%
2006-2010	260,540	76.7%	277,370	78.8%
2012-2016	269,150	77.2%	292,865	80.2%
1990 vs 2016	+34%	+2.8%	+59%	+5.2%

Source: U.S. Census, ACS summarized in Census Transportation Planning Products.

The study involves the following six major tasks:

1. Existing and Future Conditions;
2. Identification and Evaluation of Potential SOV Reduction Measures;
3. Identification of Four Sub-Regions to Study and Recommend TDM Programs;
4. Grant Program for SOV Projects;
5. Evaluation of Current Lake County Pilot Projects; and
6. Final Report.

This report covers Task 1, Existing and Future Conditions.

1.1 EXISTING AND FUTURE CONDITIONS TASK OVERVIEW

This task report of the Lake County SOV Reduction Study reviews existing and future conditions related to travel characteristics and transportation resources within the Lake County study area. The associated findings of existing and future conditions include:

- Review of Relevant Plans and Studies;
- Socio-Economic Analysis;
- Travel Characteristics; and
- Transportation Services and Facilities.

2 REVIEW RELEVANT PLANS AND STUDIES

This Section includes a review of plans and studies relevant to Lake County transportation and is intended as research that the SOV Reduction Study can build upon.

- **Lake County Transportation Market Analysis (2012)**

The Lake County Transportation Market Analysis included a detailed evaluation of the travel markets in the County as characterized by the socioeconomic characteristics of the travelers and the magnitude, directionality, and type of their travel. Further discussion of the travel market analysis is included in Section 4.4 Travel Flow Analysis .

The report also analyzed the service profile of existing fixed route and demand-responsive transit services in Lake County and developed transit service concepts that are consistent with travel market characteristics and responsive to the transportation needs of Lake County residents. Specific service improvements evaluated included Waukegan Pulse Point Relocation, Fixed Route Modifications, New Job Access Express Route, New Flexible Services (Call-n-Ride or Deviating Bus Service), and Dial-a-Ride/Paratransit Policy Coordination.

- **Lake County 2040 Transportation Plan (2014)**

This long range transportation plan (LRTP) identified deficiencies and recommended improvements to address the future transportation needs of Lake County and included analysis of roadway, transit, and non-motorized travel modes. Using a consensus-based approach, the LRTP leveraged input from multiple stakeholders and agencies. Specifically, coordination with the Blue Ribbon Advisory Council led to the recommendation for the Illinois Route 53/120 North Extension. Project recommendations from the Council are included as baseline improvements within the 2040 LRTP.

- Mode-specific transit and non-motorized recommendations were provided as separate elements based on the assessed needs of users throughout Lake County. The 2040 Transit Plan outlines the importance of investment policies and programs being paired with land use policies and programs. In particular, the report mentions that land use policies should embrace denser development, a mix of uses and traditional design to maximize access to public transportation, and incorporate features to encourage transit ridership.

- **State Highway Consensus Plan for Lake County (2018)**

The State Highway Consensus Plan was developed with input from local elected officials and the residents of Lake County. The report provides consensus on a list of priority transportation projects to bring about meaningful congestion relief to the transportation system in Lake County. The plan has been updated annually, and the most recent was in 2018.

- **Lake County Paratransit Market Study (2019)**

This study evaluated transportation options for seniors, people with disabilities, and the general public. A variety of services, such as Pace Dial-A-Ride and township programs, are currently available to assist these populations in their travels to and from medical appointments, places of employment, and other daily activities. The report provides short-, mid-, and long-term recommendations based on research conducted throughout the planning process. Major takeaways focus on first/last-mile services, mobility management staffing, and expansion of paratransit coverage throughout Lake County.

- **Policy on Infrastructure Guidelines for Non-Motorized Travel Investments (2010)**

To improve non-motorized facilities along its roadways, LCDOT established a Policy on Infrastructure Guidelines for Non-Motorized Travel Investments, or Non-Motorized Travel Policy. The intent of the policy and guidelines is to articulate an approach for considering the accommodation of bicycle, pedestrian, and other non-motorized modes of travel on and across the County's roadway system. The policy and guidelines serve to codify the County's existing practices, and to formalize its process for considering non-motorized enhancements when improving County roadways. These guidelines apply to roadways under Lake County DOT's jurisdiction.

As indicated within the policy guidelines, an effective policy should prompt LCDOT to consider other future procedures that may be needed to better implement its Non-Motorized Travel Policy. Future actions that may be considered include: (1) review and update of design standards; (2) review of processes and ordinances that should be created or changed; (3) education and training, both internal and external; and (4) additional data collection and project performance efforts. These actions provide options to be considered, evaluated, and implemented as resources allow.

- **Lake County Proposed Highway Improvement Plan (2019)**
The 5-Year Program (2020-2024) is the scheduling component of the county's long-range transportation plan and is a continual process that includes many projects at varying stages of readiness carried over from previous programs. The 5-year program covers the time period from December 1, 2019 to November 30, 2024 and is prepared 6 months in advance of the start of the County's next fiscal year.
- **CMAP ON TO 2050 Regional Comprehensive Plan (2018)**
The plan has five primary topical chapters with a set of recommendations for communities to make progress and succeed together. The five chapters include community, prosperity, environment, governance, and mobility. In particular, the mobility chapter outlines steps toward a well-integrated, multimodal transportation system that seamlessly moves people and goods within and through metropolitan Chicago.
- **CMAP Update Northeastern Illinois Regional Greenways and Trails Plan (2016)**
Adopted as a component of ON TO 2050, the Northeastern Illinois Greenways and Trails Plan (RGTP) is a long-range plan that envisions a network of continuous greenway and trail corridors. As part of the RGTP, conceptual alignments for the planned trail network are included to link communities and provide transportation and recreational opportunities. The RGTP assists implementers and funding agencies, such as Lake County, in advancing their projects as proposals that align with the RGTP can be more attractive to funding agencies.
- **Tri-County Access Project (Route 53/120 Project) (2020)**
Following the report issued by the Illinois Route 53/120 Project Blue Ribbon Advisory Council in 2012, the Illinois State Toll Highway Authority (ISTHA) commissioned the Tri-County Access Project. As initial phase of the Project was a comprehensive regional study to determine how to ease traffic congestion in Lake, northern Cook and eastern McHenry Counties. In July 2019, the Lake County Board decided to remove support for the Project, after which the ISTHA announced that it would cease work on the environmental impact study of the extension. A final report of completed work was issued in 2020.
- **North Central Service Analysis and Implementation Study (2020)**
The Metra North Central Service Corridor Analysis identified operational and capital improvements needed to enhance service along the corridor. The study determined the feasibility and capacity of local funding tools with sponsored assistance from the Village of Mundelein and funding provided by the Regional Transportation Authority's (RTA) Community Planning program. At the meeting of the study Steering Committee on October 21, 2019, members voted their commitment to continue the work to advance long-term NCS improvements.
- **Pace Vision 2020: The Blueprint for the Future (2001)**
This report covers Pace's vision for the future to provide efficient suburban mobility and describes how Pace will achieve this objective. A network of new services and infrastructure improvements leading to a decrease in travel times are proposed.
- **Driving Innovation: The Pace Strategic Vision Plan (2020)**
The update to the Vision 2020 Plan includes recommendations on service development, staffing and policy, and technology investments. The final Plan is expected to be released in late 2020.

- **Metra Strategic Plan: On Track to Excellence (2018)**

The plan provides Metra's vision and strategic goals, and the steps to achieve them within existing resources. Metra makes the case on the need for additional funding for capital investment in the system.

- **Metra Cost Benefit Analysis Study (2018)**

This study analyzed various upgrades, extensions, and new lines to the Metra system. For Lake County, analyses of upgrades of the UP-N, MD-N, NCS, and UP-NW were included. In addition, the cost and benefits to extend the MD-N from Rondout to Wadsworth and develop the STAR Line from Barrington to Waukegan were documented.

- **Lake County Rail Station TOD Studies**

Many communities in Lake County have taken advantage of the RTA Community Planning program by obtaining grants to prepare transit-oriented development (TOD) plans. Plans have been completed for Winthrop Harbor (2018), Highwood (2014), Libertyville (2017), Fox Lake (2013), Antioch (2011), Lake Villa (2013), and Buffalo Grove (2007). The program also funds transit studies, which have been completed for Lake Forest (2010), the TMA of Lake-Cook (2000), and Waukegan (2000).

3 SOCIO-ECONOMIC ANALYSIS

The socio-economic characteristics and trends of Lake County are important determinants to the range of feasible SOV reduction measures. Table 3-1 shows reported population and jobs between 2000 and 2015 for Lake County and the seven-county CMAP region, as well as the adopted CMAP forecasts for 2050. Lake County's population is expected to grow by 30 percent between 2015 and 2050, while job growth is forecasted at 23 percent from 2015 levels. From 2015 to 2050, Lake County forecasts outpace CMAP Region-wide forecasts by 3.3 percent in population and by 0.8 percent in jobs. Lake County population and jobs account for roughly 8 percent of the seven-county regional total.

Table 3-1. Population and Jobs (2000-2050)

	Population			Jobs		
	Lake County	Region*	% Lake	Lake County	Region*	% Lake
2000	644,356	8,146,264	7.9%	354,114	4,341,117	8.2%
2010	703,462	8,431,386	8.3%	314,717	3,802,984	8.3%
2015	703,912	8,524,670	8.3%	338,099	4,085,553	8.3%
2050	917,196	10,826,002	8.5%	416,700	4,999,618	8.3%
2000 to 2050	42.3%	32.9%	-	17.7%	15.6%	-
2015 to 2050	30.3%	27.0%	-	23.2%	22.4%	-

Source: CMAP (GO TO 2050).

Note: *Seven-County CMAP Region - Cook, DuPage, Kane, Kendall, Lake, McHenry, Will Counties.

CMAP population and employment data were mapped for 2015, including the change between 2015 and 2050, by Lake County local allocation zone (LAZ) in Figure 3-1 through Figure 3-4. LAZs are a recent refinement to the previous quarter-section geography used for traffic and land use modeling.

Figure 3-1. Population (2015)

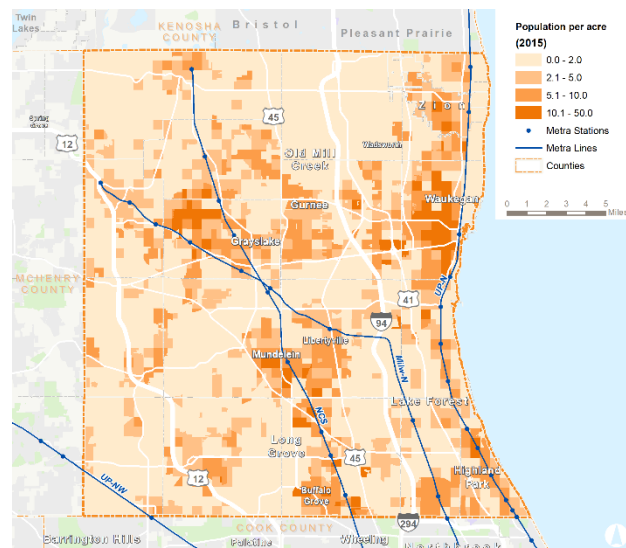
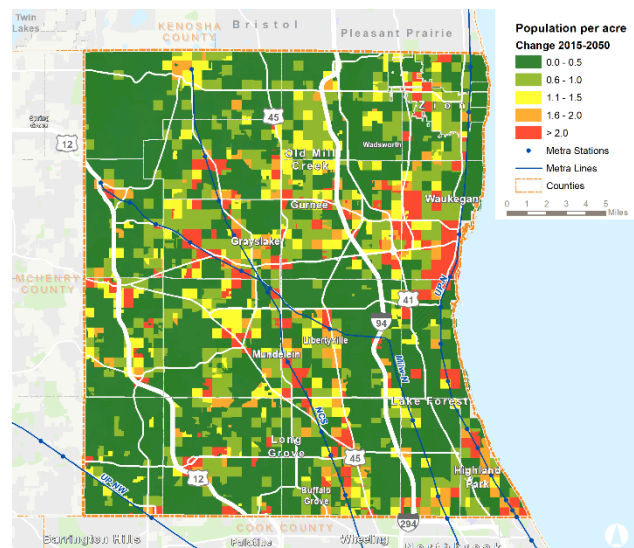


Figure 3-2. Population Change (2015-2050)



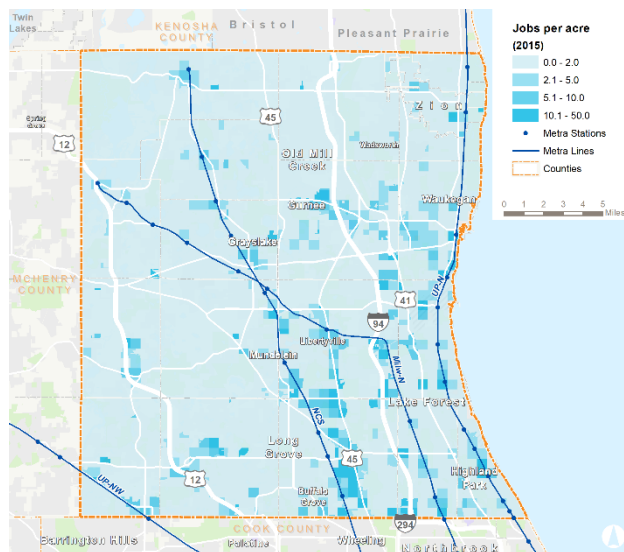
Source: CMAP (GO TO 2050).

Figure 3-1 provides an overview of LAZ population in Lake County in 2015. Pockets of dense population (more than ten people per acre) are geographically scattered within a few areas across Lake County. Waukegan (northeast), Round Lake Beach (northwest), Mundelein (central), and Highland Park (southeast) represent locations where population is concentrated. Corresponding with population density

is Metra rail access. Locations with higher population density typically have a Metra rail station in proximity, which is commonly based on the historical development pattern of the County.

Figure 3-2 provides an overview of forecasted population change in Lake County from 2015 to 2050. A review of future population projections reveals socio-economic trends that may impact transportation infrastructure decisions. Population over the 35-year period is expected to grow across Lake County – particularly in areas surrounding existing municipalities. This future growth can likely be attributed to population bases growing outward to utilize existing undeveloped land. As this sort of development occurs, transportation infrastructure will need to adapt to ensure efficient and effective transportation options exist for residents in Lake County.

Figure 3-3. Employment (2015)



Source: CMAP (GO TO 2050).

Figure 3-4. Employment Change (2015-2050)

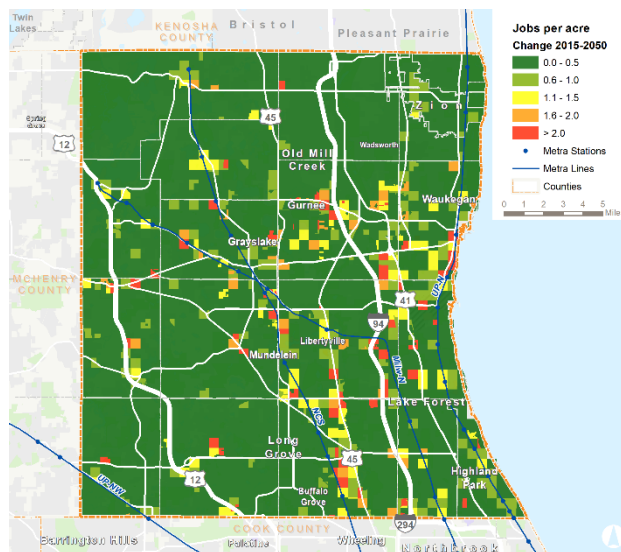


Figure 3-3 provides an overview of employment in Lake County in 2015. Employment characteristics reveal small clusters with a high concentration of jobs, notably in Buffalo Grove, Deerfield, Highland Park, and Waukegan. Many existing employment centers are in close proximity to Metra stations along the MD-N, NCS, and UP-N lines.

Figure 3-4 provides an overview of forecasted employment change in Lake County from 2015 to 2050. The areas of highest growth tend to be aligned with transportation corridors—both roadway and rail. Future job growth will impact commuting patterns and transportation choices for Lake County employees.

4 TRAVEL CHARACTERISTICS

4.1 TRAVEL BY MODE

Table 4-1 provides an overview of work travel mode choice for Lake County residents and surrounding county residents by year from 2010 to 2018. The rank of county shares is color-coded from highest rank to lowest rank using a 5-point scale. In comparison to its peer counties, Lake County generally ranks near the average for the modal splits of the region. From 2010 to 2018, Lake County has shown minor fluctuations in the percentage of travelers driving alone (76 percent to 78 percent) and the percentage of work-trips via public transit (four to five percent). Overall, more than three-quarters of travelers in Lake County drove alone in 2018, while less than 15 percent used public transportation or carpool.

Table 4-1. Work Travel Mode by Residents of County (2010-2018)

Drive Alone	2010	2011	2012	2013	2014	2015	2016	2017	2018
Will County (IL)	82%	83%	84%	84%	85%	84%	84%	85%	81%
Cook County (IL)	63%	62%	62%	62%	62%	62%	62%	61%	61%
DuPage County (IL)	78%	79%	78%	79%	78%	77%	76%	77%	77%
Kane County (IL)	83%	79%	79%	81%	80%	81%	81%	80%	77%
Kendall County (IL)	83%	84%	86%	87%	86%	86%	81%	82%	90%
Lake County (IL)	78%	76%	78%	77%	77%	78%	76%	77%	76%
Kenosha County (WI)	84%	83%	86%	86%	84%	85%	84%	85%	86%
Racine County (WI)	84%	84%	84%	83%	83%	83%	83%	86%	85%
Walworth County (WI)	82%	78%	84%	83%	78%	83%	80%	82%	82%
McHenry County (IL)	80%	84%	83%	83%	81%	83%	83%	84%	82%
Carpooled	2010	2011	2012	2013	2014	2015	2016	2017	2018
Will County (IL)	7%	7%	6%	6%	6%	5%	6%	5%	7%
Cook County (IL)	9%	9%	9%	9%	8%	8%	8%	8%	8%
DuPage County (IL)	8%	7%	8%	8%	7%	7%	6%	6%	7%
Kane County (IL)	7%	11%	11%	10%	9%	9%	9%	9%	12%
Kendall County (IL)	7%	9%	7%	5%	7%	7%	7%	8%	5%
Lake County (IL)	8%	9%	8%	7%	7%	8%	9%	9%	8%
Kenosha County (WI)	8%	10%	8%	7%	8%	8%	11%	8%	7%
Racine County (WI)	9%	7%	8%	9%	7%	8%	11%	6%	6%
Walworth County (WI)	8%	11%	7%	7%	12%	8%	8%	8%	7%
McHenry County (IL)	9%	7%	7%	8%	8%	6%	7%	6%	7%
Public Transportation	2010	2011	2012	2013	2014	2015	2016	2017	2018
Will County (IL)	5%	4%	3%	4%	4%	4%	4%	3%	4%
Cook County (IL)	17%	18%	18%	19%	19%	19%	19%	19%	19%
DuPage County (IL)	7%	6%	6%	6%	7%	7%	7%	7%	7%
Kane County (IL)	3%	3%	2%	2%	3%	3%	2%	3%	2%
Kendall County (IL)	2%	2%	2%	3%	2%	2%	5%	2%	1%
Lake County (IL)	4%	4%	4%	5%	4%	4%	4%	5%	5%
Kenosha County (WI)	2%	1%	1%	1%	1%	1%	1%	1%	1%
Racine County (WI)	1%	2%	1%	1%	2%	2%	1%	1%	2%
Walworth County (WI)	0%	1%	1%	1%	1%	0%	1%	1%	0%
McHenry County (IL)	3%	3%	3%	2%	3%	3%	2%	2%	2%

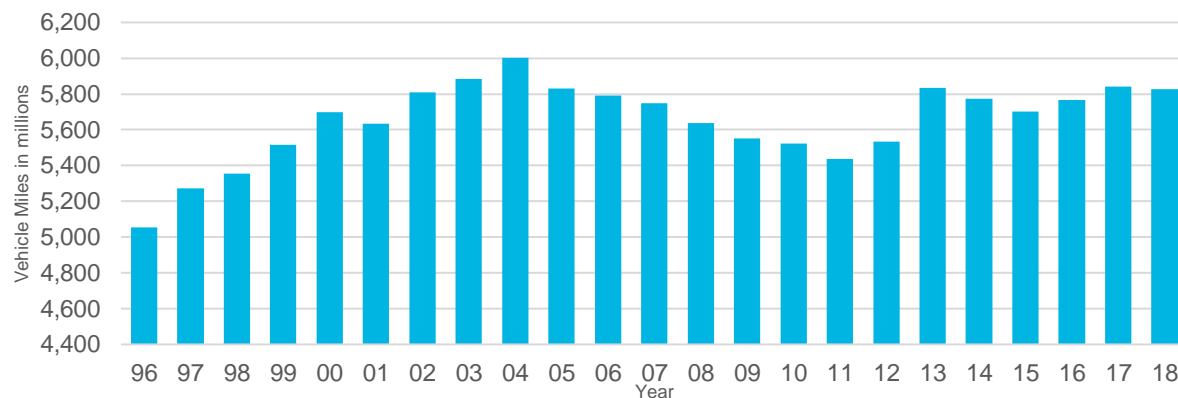
Source: U.S. Census, ACS.

Scale:	5	4	3	2	1
	Highest	Higher	Average	Lower	Lowest

4.2 VEHICLE MILES TRAVELED

A common variable used in transportation planning is vehicle miles of travel (VMT), which measures the amount of travel for all vehicles in a geographic region over a given period of time. This is relevant given that the majority of miles traveled is in SOVs. The Illinois Department of Transportation (IDOT) reports this statistic by county in the annual report *Illinois Travel Statistics*. Figure 4-1 graphs Lake County VMT between 1996 and 2018. Mileage peaked in 2004, declined through to 2011, and has remained generally constant since experiencing a substantial increase in 2013. Changes in VMT are a result of many factors, such as population and economic growth or decline, auto ownership rates, gas price, transit availability and quality, shifts in cultural preference, and demographic characteristics, including age. The recession of 2007-2009 is evidenced in the trend, though notably it does not appear to have been the precipitating event in the lengthy decline between 2005 and 2011.

Figure 4-1. Annual Lake County Vehicles Miles (1996-2018)



Source: IDOT *Illinois Travel Statistics*.

The VMT trend in Lake County since 2004 has been lower than was reported for the seven-county Chicago region and for the nation, as shown on Figure 4-2. The reasons Lake County has seen lower growth are not clear and could be the result of comparatively smaller population growth, more compact development, better transit access to name some possibilities. It is also possible that Lake County VMT was comparatively higher in 2000, and thus started at a higher base point. The comparison with the Chicago region is difficult due to the influence of the more urbanized areas in the City of Chicago.

Figure 4-3 plots the ratios of VMT and population for the three geographies. On a per capita basis, Lake County has more VMT per person than the Chicago seven-county region, but fewer miles per person compared to nation-wide rates.

Figure 4-2. Relative VMT from Year 2000

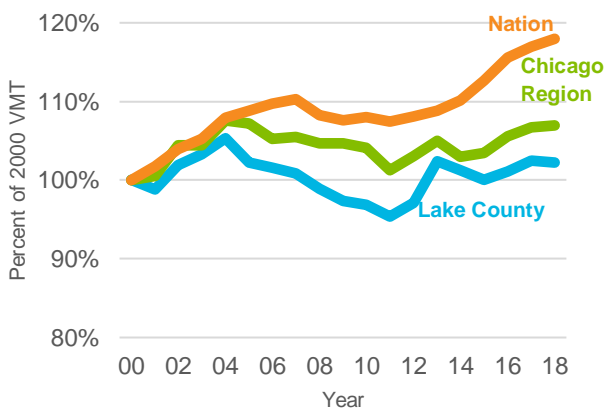
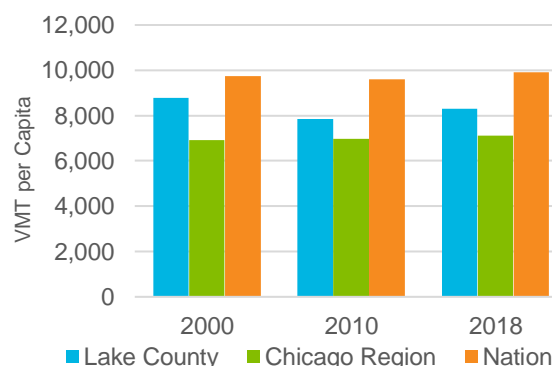


Figure 4-3. VMT per Person, for 2000, 2010, 2018

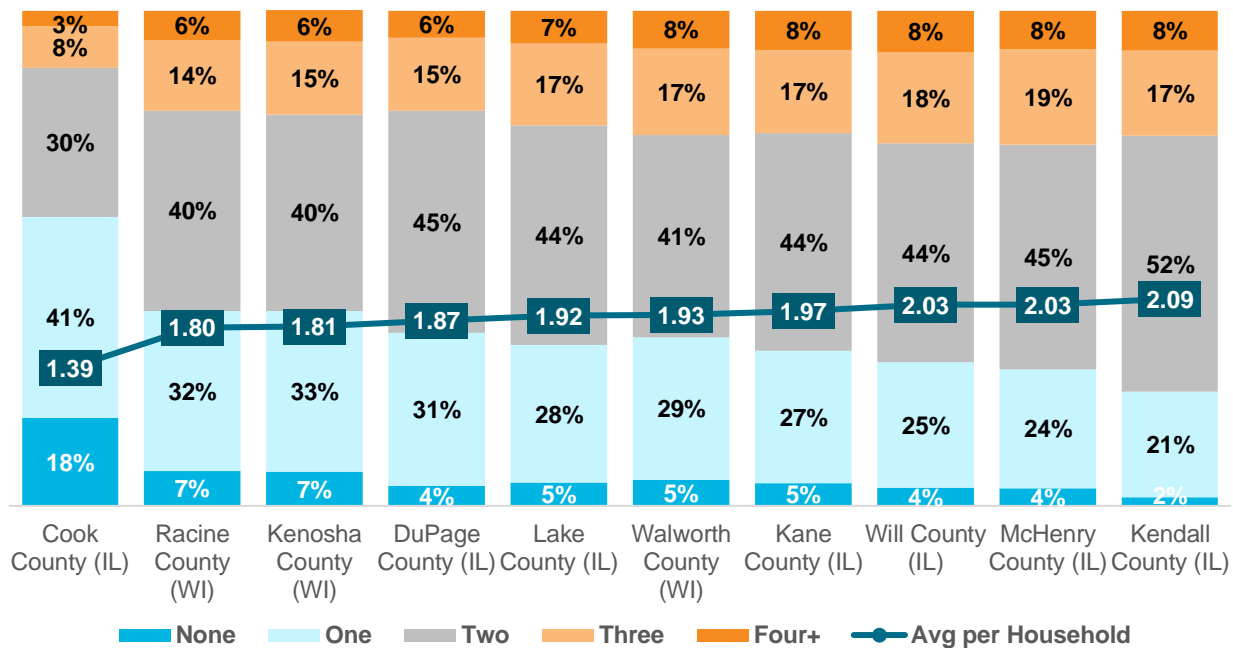


Source: IDOT *Illinois Travel Statistics* for Lake and Chicago region; FHWA, *Traffic Volumes and Trends* for Nation.

4.3 VEHICLE AVAILABILITY

The number of vehicles available to households typically also correlates with VMT. Figure 4-4 shows the distribution of households by vehicles available for each of the seven counties of the Chicago region and three counties nearest to Lake County in Wisconsin (i.e., Kenosha, Racine, and Walworth). A weighted average of vehicles per household was calculated for each county, which assumed 4+ vehicles as 4.0 vehicles. The data shows that over two thirds of Lake County households have more than two cars.

Figure 4-4. Number of Vehicles Available by Household by County (2013-2017)



Source: U.S. Census Bureau, ACS.

4.4 TRAVEL FLOW ANALYSIS

4.4.1 Previous Travel Flow Analysis

As noted in Section 2, travel flow analysis was carried out in the *Lake County Transportation Market Analysis (2012)* to develop transit concept recommendations. This study relied on the following data sources:

- **CMAP:** Population and employment (2010 and 2040), travel demand model trip tables;
- **Census:** ACS 2005-2009 household, person, commute characteristics; Census Transportation Planning Package (CTPP 2000) journey to workflows; and
- **Other:** Dun and Bradstreet employment data; Metra origin-destination survey (2006); Pace Customer Satisfaction survey (2007); RTA Attitudinal Survey (2009).

Analysis of these data sources resulted in an estimated 2.1 million trips produced (i.e., originated) in Lake County each day and 2.3 million trips attracted (i.e., destined) to Lake County each day. About 1.7 million (84 percent) of trips that were produced in Lake County ended within the County as well, while about 200,000 were destined for Cook County and the remainder traveled to other counties. Work trips were estimated at 460,000 produced in Lake County and 480,000 attracted to Lake County (including 90,000 from Cook County).

While detailed figures were not provided in the summary report, top trip producers and attractors are described in Figure 4-5, with the darker blue tier indicating a higher share of trips

Figure 4-5. Top Trip Origins and Destinations in 2012 Market Analysis



Source: *Lake County Transportation Market Analysis (2012)*.

The study resulted in the identification of five key travel markets for transit improvements:

- **Intra-Waukegan** (including Waukegan and neighboring North Shields Township)
 - 167,000 trips
- **Greater Round Lake** (including western portion of North Libertyville) **to Central Corridor** (Mundelein / Vernon Hills & North Central Lake-Cook)
 - 42,000 trips; 27,000 work trips
- **Waukegan to Central Corridor**
 - 36,000 trips; 14,000 work trips
- **Intra-Central Corridor (including areas just south of Lake-Cook Road)**
 - 552,000 trips; 58,000 work trips
- **Greater Round Lake – West Gurnee – West Waukegan / Gurnee**
 - 72,000 trips; 8,000 work trips

4.4.2 Origin-Destination Data Sources

Three primary origin-destination data sources were used in the travel flow analysis for the SOV Reduction Study: StreetLight, Longitudinal Origin-Destination Employment Statistics (LODES), and CTPP, described in further detail below. These data sources each have their strengths and weaknesses, but they are all fundamentally similar in that they describe existing travel patterns (with the inclusion of some statistical techniques to introduce noise for privacy reasons). In contrast, the CMAP travel demand model trip tables are the output of a behavioral model using a synthetic population, which is necessary in order to project future travel flows.

4.4.2.1 StreetLight

StreetLight Data is a company that specializes in collecting, analyzing, and distributing anonymized transportation data gathered from mobile devices and other sources. To summarize the overall process, StreetLight purchases billions of spatial/temporal data points from various platforms (location-based service apps, connected cars, fleet management systems, etc.), and then the cloud-based StreetLight processing engine integrates these data with contextual features (e.g., infrastructure, traffic counts, socioeconomics, and land use) to produce analyses at the micro- and macro-levels. Users cannot adjust the processing parameters or “look under the hood” of the proprietary algorithms, which can make it challenging to parse patterns without running a custom analysis.

The primary metric is vehicle counts—which is reflective of the platform’s focus on automobile travel. Users are able to manipulate various attributes in terms of time and place in order to elicit trends.

- **Geography:** Users can delineate custom geographies to better encapsulate useful clusters of trip starts and ends—something that is not possible with Census data, which is reported only at standardized geographies. The StreetLight analysis zones can also be far smaller in size than Census geographies, which will be useful in later stages of analysis, when specific travel corridors have been or need to be identified. At this stage, analysis has focused on macro zones that are roughly the same as townships within Lake County, and (subsets of) counties outside of Lake County.
- **Time:** The second major advantage of StreetLight data, aside from custom geographies, is its recency and the ability to conduct time series analysis or specify parts of the day. Census data is available at either annual or multi-year intervals (with the most recent being 2017), while it is possible with StreetLight to compare month-to-month trends over time from 2016 to 2020.
- **Traveler Attributes:** For a given analysis, the StreetLight engine estimates the trip purpose (Home-, Work, or Other-based combinations), as well as the demographics of travelers. Given the challenge of modeling such attributes, it is not recommended to rely too heavily on these attributes.
- **Trip Attributes:** An average and distribution of values is provided for trip metrics such as duration (in seconds), length (in miles), speed, and circuitry (a measure of the “directness” of the trip).

While StreetLight provides numerous valuable insights, the reported values cannot be taken at face value. Caveats to using StreetLight data for this study include the following:

- **Trip Breaking:** The algorithm used by StreetLight officially “ends” a trip after the device has not moved 5 meters in 5 minutes. Based on discussions with StreetLight Data staff, the abnormal proportion of short-distance trips found in the AECOM analysis (discussed below) was primarily due to this design feature. AECOM was informed that modifying this parameter via a custom analysis can be accomplished for an additional charge, as it requires the assistance of the company’s software engineers to recode the parameters. For this analysis, it was decided to not perform this custom analysis, although it may be considered for analyses in subsequent tasks.
- **Vehicle Focus:** As noted above, the platform focuses on vehicular travel, which often requires calibrating the trip volumes with traffic count data they acquire from other organizations. For locations with a high-proportion of transit or carpooling trips, this can introduce a degree of inaccuracy, though it’s not possible to discern how much. At this time, there is also no functionality

that enables users to categorize the trip volumes into travel modes. Thus, it is impossible to distinguish whether trips are made by bus or by car on a given roadway.

Finally, it should be emphasized that StreetLight (and other transportation data providers) are filling a key data gap in transportation analytics: non-work trips. Since Census origin-destination data is limited to work trips, StreetLight data was acquired to provide insight for non-work travel, which can account for upwards to 80 percent of all trips.

4.4.2.2 U.S. Census Longitudinal Origin Destination Employment Statistics

The LODES dataset is a component of the Longitudinal Employer-Household Dynamics (LEHD) data products produced by the US Census Bureau. LODES is based primarily on administrative records (in particular, the information reported as part of the Unemployment Insurance program, covering over 95 percent of the total workforce) and the Quarterly Census of Employment and Wages.

Due to its heavy reliance on administrative data, LODES (and LEHD more generally) is known to experience the headquartering effect in which workers have their “workplace location” assigned to the headquarters/central office of their employer even though they may actually travel to and perform their work elsewhere or even at home. This problem is especially prevalent among organizations such as school districts, construction companies, large public universities, and other large employers. The Chicago region may suffer from this headquartering effect to a greater extent than less urban locations due to the large number of headquarters/central offices in the metro area—particularly in Cook County. As discussed later, analysis of the LODES data shows an overweighting of trips to/from Cook County in comparison with other origin-destination datasets.

As noted above, LODES data has no information on travel mode or whether the worker primarily telecommutes—a growing trend in the past decade that is likely to continue to increase. In particular, impacts of the COVID-19 pandemic, as of this writing, may have a lasting effect on this arrangement, especially as both employees and employers have become more accepting of the practice. Additional follow-on research on the long-term impact on travel trends is recommended. LODES data has information about the worker’s income level, age, and NAICS (North American Industry Classification System) industry super-sector of the worker’s employer.

LODES data is released at an annual level, with the most recent year currently available being 2017 (released in 2019). Data from 2016-2017 suffer from some undercounting due to the inability of the program to come to an agreement with the Office of Personnel Management to acquire data on federal workers. For this reason, it is assumed that there are no federal workers in the LODES data analyzed. According to recent data from the Bureau of Labor Statistics, about 1.6 percent of workers in Lake County are federal workers.

The geography of the LODES dataset is the Census block, which is the smallest of the standard Census geographies and thus suitable for more detailed analysis at later phases of this project.

4.4.2.3 U.S. Census Transportation Planning Products

CTPP data is based on ACS responses (replacement to the long-form Census, covering less than 10 percent of the population; no origin-destination data has been included in the decennial Census since 2000). As it is produced using survey data rather than administrative records, the CTPP should reflect accurate home and work locations without a headquartering effect, which is an improvement over the LODES data.

However, as it is a survey, CTPP is affected by sampling errors at smaller levels of geography and reporting errors due to incomplete survey responses (e.g., workplace locations with insufficient detail to

be geocoded). As reported in a Transportation Research Board-commissioned paper, CTPP may omit some low-frequency origin-destination pairs due to sampling.¹

The CTPP data is published less frequently than LODES (roughly every five years). The most recent dataset includes the five-year estimates 2012-2016, which was published late 2019.

The most commonly used geography in the CTPP is the Census tract as it is a standardized geography that can be easily aggregated and disaggregated using the Census Federal Information Processing Standard (FIPS) crosswalks. However, traffic analysis zone (TAZ) level data is also available and may be used for more detailed analysis. For comparison, there are 372 TAZs in Lake County versus 154 Census tracts.

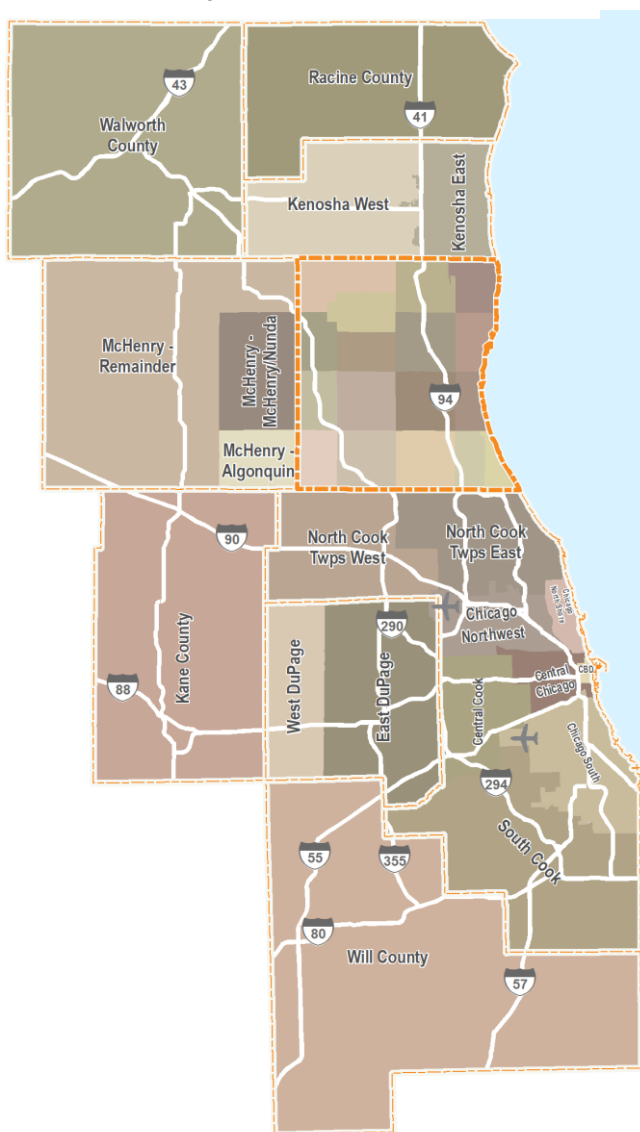
CTPP provides a number of other useful commuter attributes, including travel mode, travel time, vehicles available, poverty status, industry, and others. Telecommuters can be included or excluded.

4.4.3 StreetLight Total Flows

At the outset of the project, the project team identified 37 macro zones (Figure 4-6) for the initial origin-destination analysis that would provide an overview of general trends and help guide the selection of subregions that would undergo detailed analysis in later phases of this project. These zones include 17 within Lake County, generally aligning with townships, and nearby counties, either as a whole or divided into subareas based on potential travel market size.

Travel flows between these zones were analyzed using StreetLight data, primarily focusing on the monthly average from April 2019 for several reasons: to avoid data skew from holidays or special events, to ensure that the highest level of trip volumes are captured, and to make the most of data recency by focusing on 2019. To assess the quality of the insights gleaned from the StreetLight data, these results from the StreetLight data are compared against the findings from the Census commuter data sources (LODES and CTPP) in a later subsection of this report.

Figure 4-6. Macro Zones



¹ Seo, J. H., et al. "The CTPP Workplace Data for Transportation Planning: A Systematic Review." (2017). Transportation Research Board, 2017 Applying Census Data for Transportation Conference.

For context, Lake County travel flows have been declining slightly since 2017, as shown in Figure 4-7 (at the quarter-year aggregation to improve chart legibility). The shorter-distance (and thus likely more discretionary) trips within zones have decreased more rapidly than the inter-zone trips. The quarterly trend in inter- versus intra- trips is shown in Figure 4-8.

Figure 4-7. Lake County Average Daily Trip Volumes (StreetLight Q2, 2016-2019)

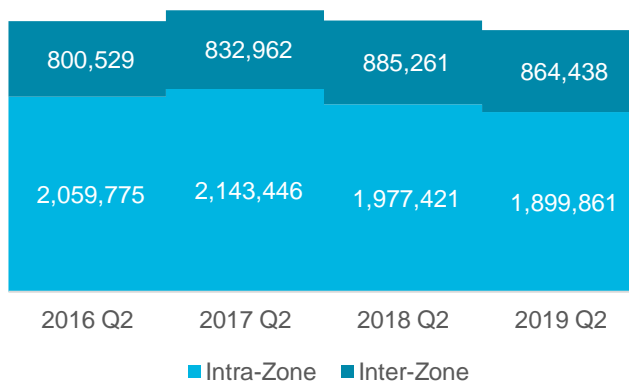
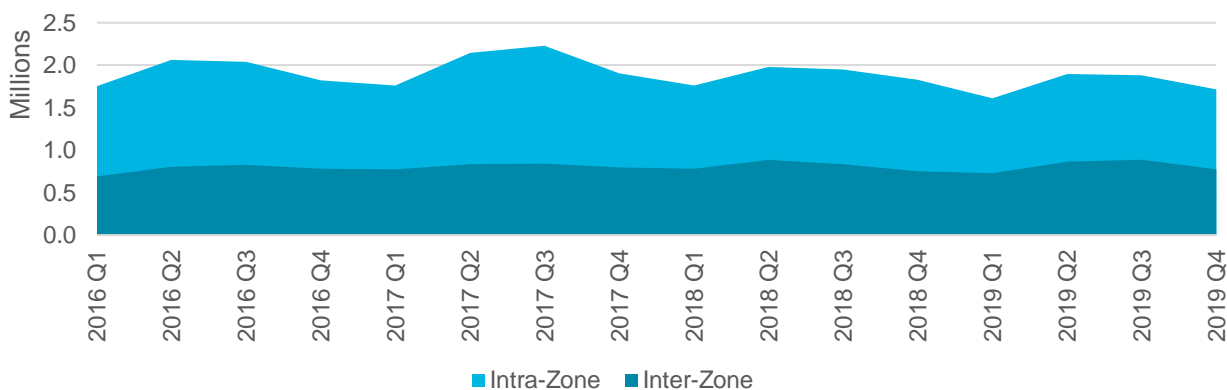


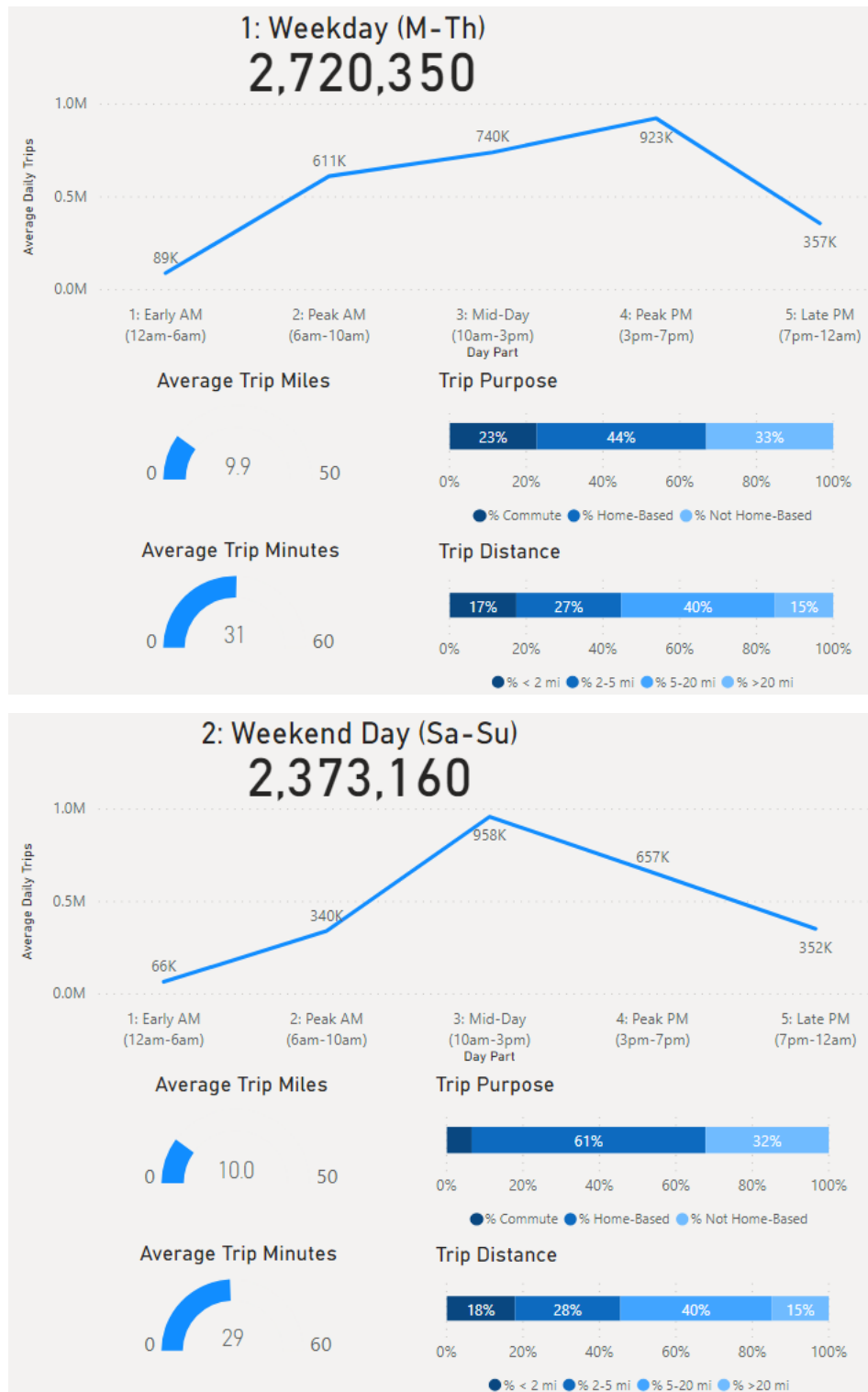
Figure 4-8. Lake County Average Daily Trip Volumes (StreetLight by Quarter, 2016-2019)



4.4.3.1 Time, Distance, and Travel Purpose

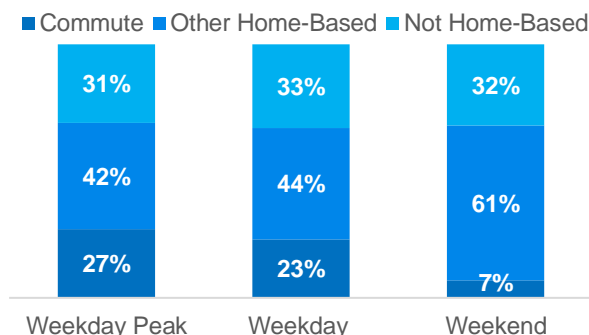
Analysis of StreetLight data from April 2019 shows an average of 2.66 million trips to and from Lake County each day, including both weekdays and weekends. There are approximately 350,000 more trips taking place on weekdays than on weekends (2.72 million versus 2.37 million). The greatest number of weekday trips occur during the PM Peak (3pm to 7pm), while the greatest number of trips on weekends occurs mid-day (10am to 3pm). Highlights from the data analysis show weekday versus weekend travel patterns in Figure 4-9.

Figure 4-9. Lake County Weekday and Weekend Travel Metrics (StreetLight)



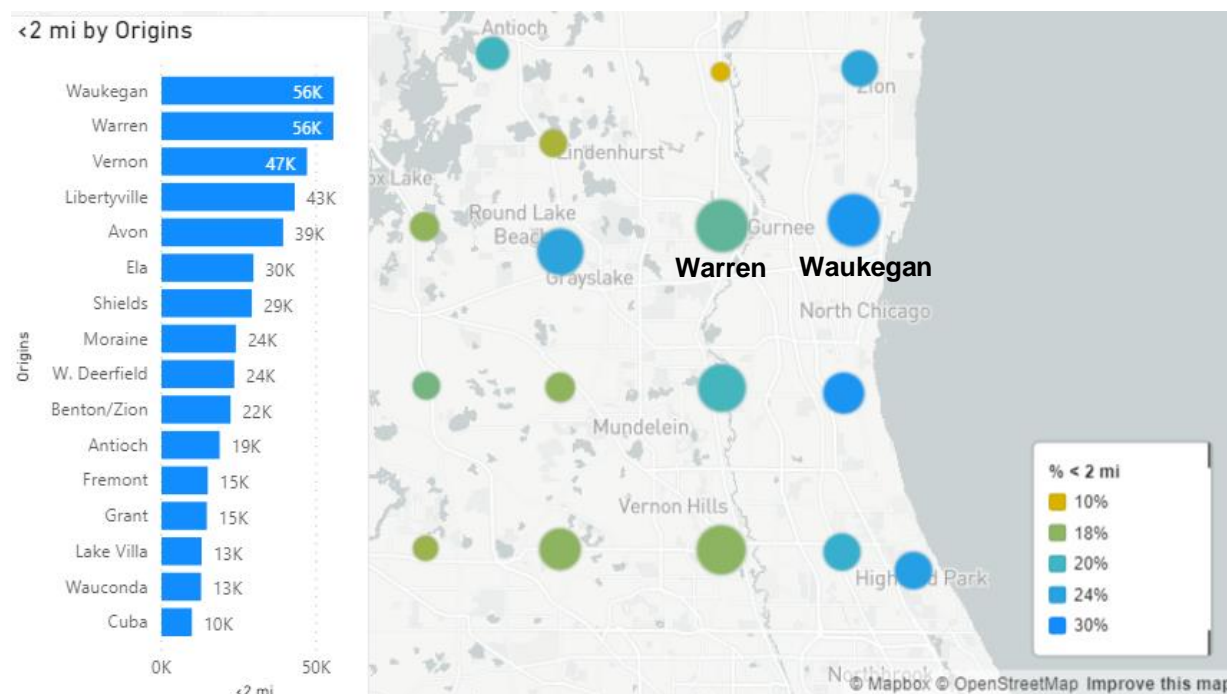
In terms of modeled trip purposes, during the weekday AM/PM peak, 27 percent of trips are commuting (i.e., home-based work trips), 42 percent are other (i.e., non-work) home-based trips, and 31 percent are not home-based trips (Figure 4-10). The weekday AM/PM peak experiences the highest share of commuting. The share of commutes drops from 27 percent to 23 percent for the full-day weekday average, and to 7 percent on weekends. Overall, the StreetLight data indicate that commute trips make up a larger proportion of total trips in locations with lower residential densities, presumably because the relatively higher cost of traveling longer distances encourages people to reduce discretionary trips, or these areas experience a higher degree of trip-chaining, and thus these trips are reclassified to other trip purpose categories.

Figure 4-10. Lake County Trip Purpose by Day/Time (StreetLight)



Roughly 17 percent of trips (468,500 trips per day) are under two miles in length, and 45 percent are under 5 miles. However, due in part to the outsize impact of very long trips, the average trip distance overall is 10 miles, and the average trip time is 30 minutes. The distribution of short-distance trips (i.e., those shorter than two miles and thus potentially completed by non-motorized travel) is provided in Figure 4-11, where the size of the bubble represents the number of short-distance trips and the color is their percentage of total trips. For example, Warren and Waukegan townships have comparable numbers of short-distance trips (about 56,000), but in Waukegan township they represent a higher proportion of total trips (27 percent vs. 19 percent). It is notable that the townships along the lakefront (Moraine, Shields, Waukegan) tend to exhibit a higher share of these very short-distance trips than those along the central I-94 corridor (e.g., Vernon, Libertyville, Warren Townships).

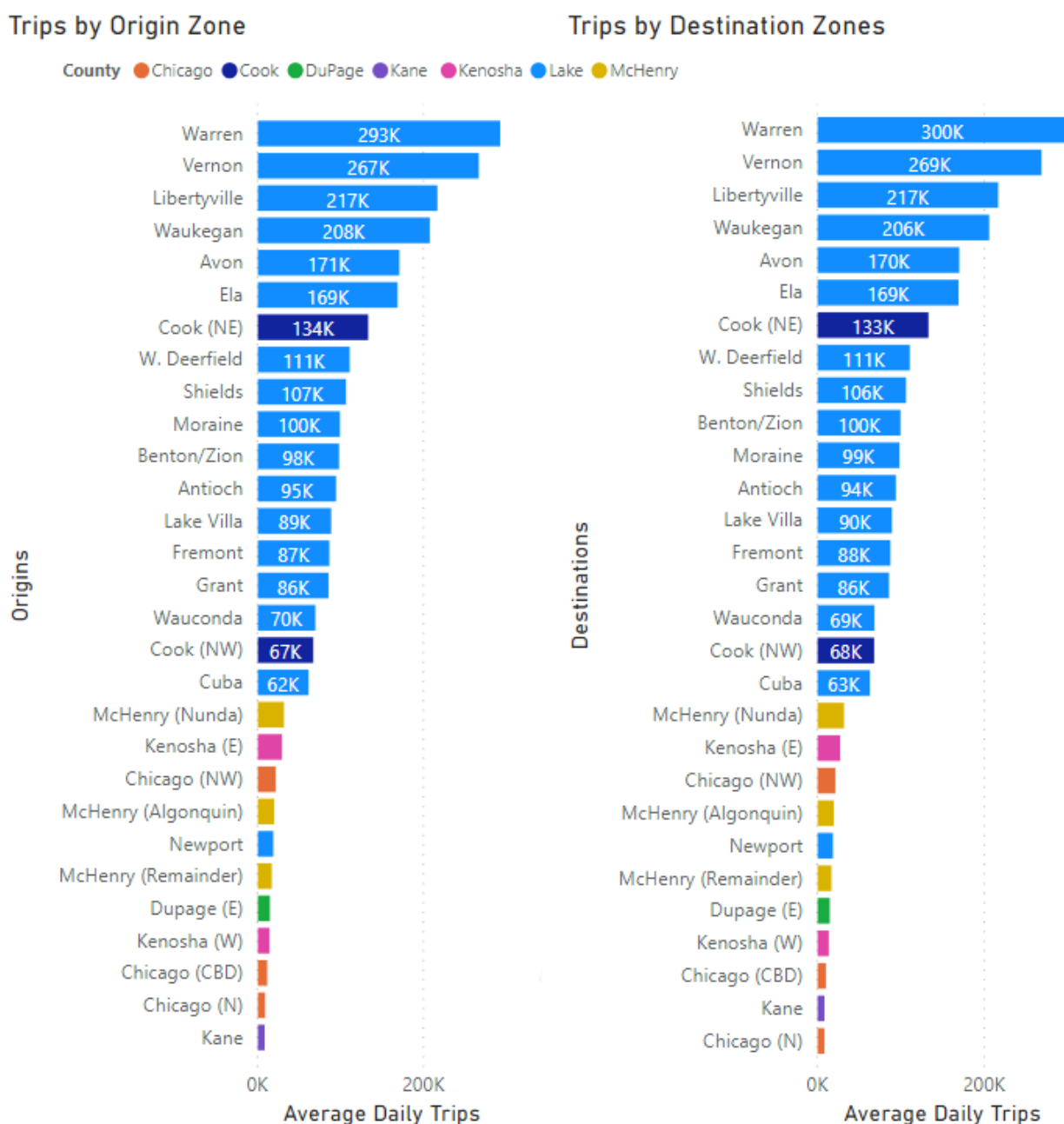
Figure 4-11. Lake County Short-Distance Trip Origins (StreetLight)



4.4.3.2 Origins and Destinations

The most common origin and destination macro zones (considered individually, rather than as an origin-destination pair) are shown in Figure 4-12. The locations with the most trip generators and attractors are Warren, Vernon, Libertyville, Waukegan, Ela, and Avon Townships. Outside of Lake County, the highest number of trips are to northeast Cook County—about twice as many as northwest Cook County.

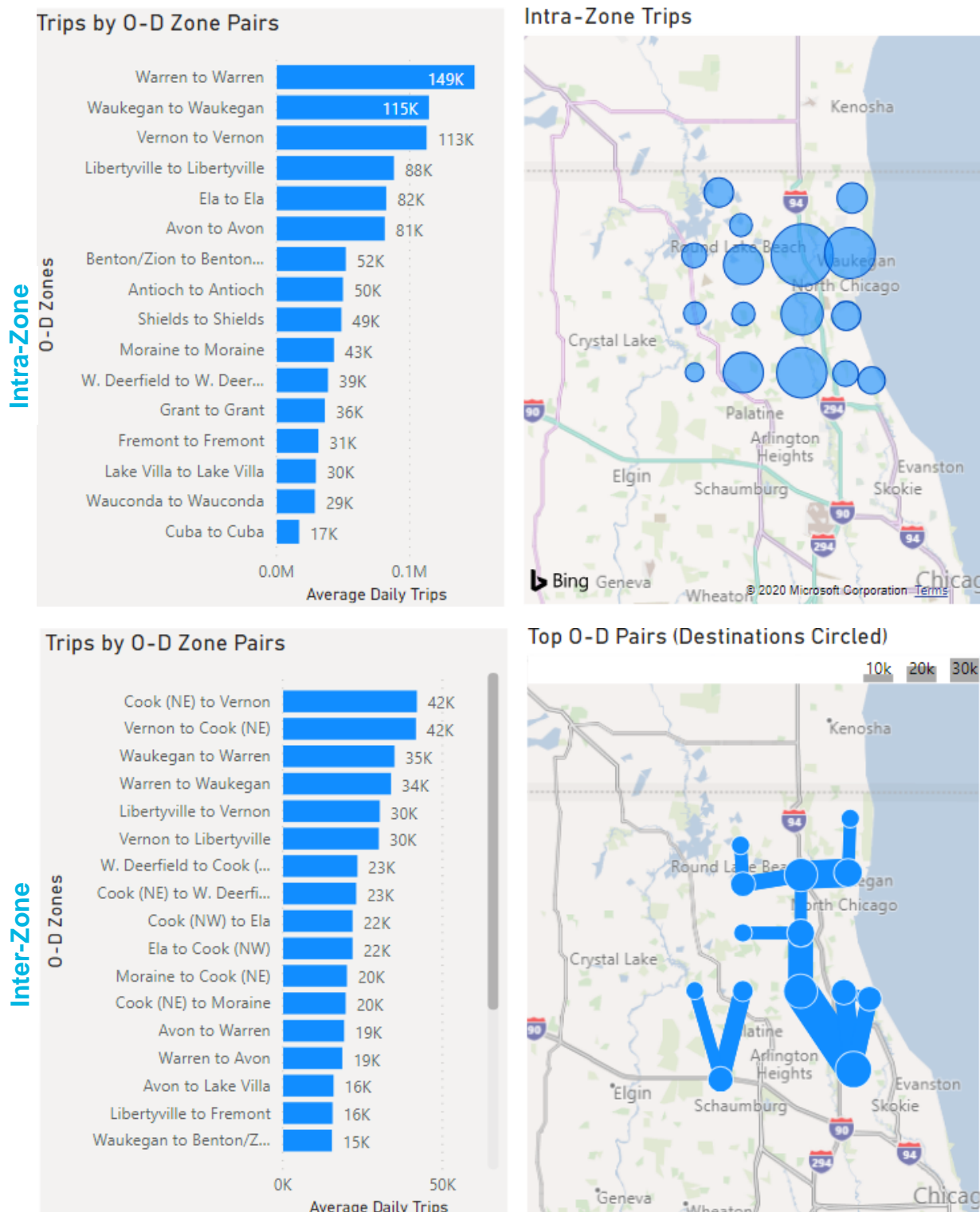
Figure 4-12. Average Daily Trips by Origin and Destination Macro Zones (StreetLight)



The individual origin-destination pairs with the greatest number of trips are intra-zone, i.e., starting and ending within the same macro zone. The greatest number of trips (149,000) are intra-Warren Township trips, which includes Gurnee, SW Waukegan, Park City, Gages Lake, followed by intra-Waukegan Township (115,000) and intra-Vernon Township (113,000). Overall, just over one million intra-zone trips occur each day—or roughly 38 percent of total trips.

Inter-zone flows are smaller in size on an individual origin-destination pair basis, but make up a larger proportion (62 percent, or 1.66 million) of the total trips due to the greater number of possible permutations. They also have a greater share of commute trip purposes (20 percent vs. 16 percent). Further details about intra- versus inter-zone pairs can be found in Figure 4-13, including the list of origin-destination pairs with the highest number of average daily trips.

Figure 4-13. Intra-Zone and Inter-Zone Trip Metrics and O-D Pair Trip Volumes (StreetLight)



Among inter-zone trips, the most common origin-destination pairs are:

- Vernon Twp.—NE Cook County
- Waukegan Twp.—Warren Twp.
- Libertyville Twp.—Vernon Twp.
- Elia Twp.—NW Cook County
- West Deerfield Twp.—NE Cook County
- Moraine Twp.—NE Cook County
- Avon Twp.—Warren Twp.
- Avon Twp.—Lake Villa Twp.
- Libertyville Twp.—Fremont Twp.
- Waukegan Twp.—Benton/Zion Twp.
- Libertyville Twp.—Warren Twp.
- Cuba Twp.—NW Cook County
- Moraine Twp.—W. Deerfield Twp.

A larger subset of the total inter-zone flows are depicted in Figure 4-14. This map shows straight-line links between the top 100 origin-destination pairs (there are nearly 1,000 total possible pairs), which comprise one million of the total average daily trips. As shown, there are no major flows outside of Lake County and the immediately adjacent counties (Cook, Kenosha, and McHenry counties). For example, trips to/from DuPage County (36,000, mostly eastern DuPage), Kane County (17,000), Will County (7,700), and others do not emerge as top origin-destination pairings and therefore are not shown on this map.

For reference, a matrix summarizing the trips to and from each of the origins and destinations in this top 100 subset is provided in Table 4-2, sorted by the number of trip origins. Cells are formatted from white to dark blue for inter-zone trips, and white to green for intra-zone trips.

Figure 4-14. Top 100 Inter-Zone Flows (StreetLight)

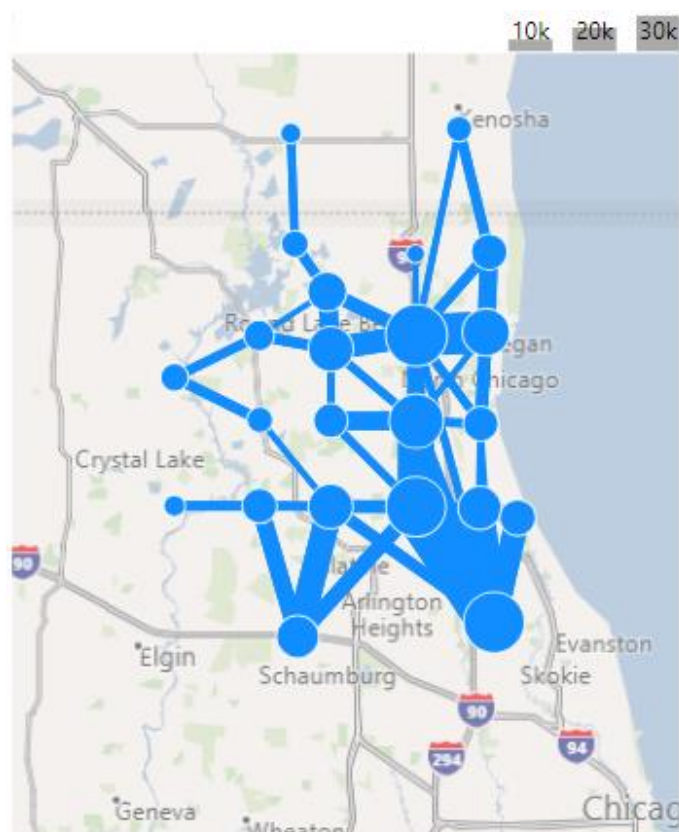


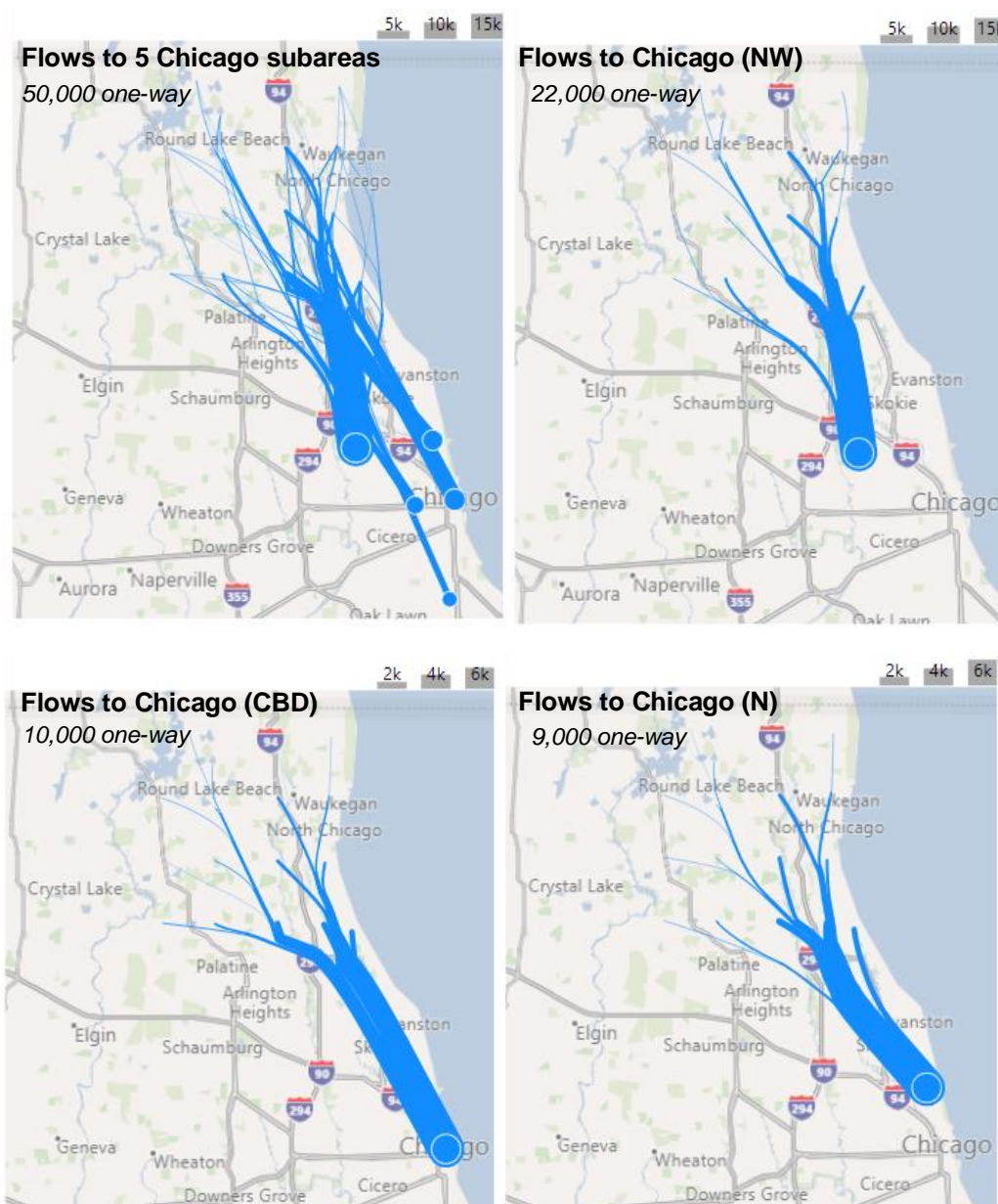
Table 4-2. Top 100 Flows Matrix (StreetLight)

	Destinations																						Total Origins	
	Vernon	Cook (NE)	Warren	Liberty- ville	Wauk- egan	Avon	Ela	W. Deerfield	Cook (NW)	Lake Villa	Shields	Moraine	Benton/ Zion	Cuba	Fremont	Grant	McHenry (Nun)	Antioch	Kenosha (E)	Wau- conda	McHenry (Alg)	Kenosha (W)		Newport
Origins	Vernon	112,820	41,700	4,790	30,060		10,730	8,390	12,960						6,880									115,510
	Cook (NE)	42,000		6,630	10,120		9,980	22,970				19,670												111,370
	Warren		6,250	148,940	13,490	33,900	18,630			11,650	7,010		8,550						5,190				4,700	109,370
	Libertyville	30,370	9,800	15,140	88,250	5,030	7,310				7,310				15,580									90,540
	Waukegan			34,980	5,150	114,600					10,440		15,390											65,960
	Avon			19,190	6,960		81,330			15,880					6,460	9,050								57,540
	Ela	10,290	9,480				82,490		21,840					7,960						5,110				54,680
	W. Deerfield	9,090	23,360					38,640			6,110	13,410												51,970
	Cook (NW)	12,480					21,840							14,280										48,600
	Lake Villa			10,990		15,300				29,530							4,460		8,330					39,080
	Shields		4,450	7,290	7,520	10,480		6,080			48,730													35,820
	Moraine		20,080					14,100				43,140												34,180
	Benton/Zion			8,720		14,220							52,030							8,110				31,050
	Cuba						7,400		14,370					16,890								7,740		29,510
	Fremont	6,640			14,760		6,530								31,400									27,930
	Grant					8,650				4,450						36,280	7,740							20,840
	McHenry (Nun)															7,920				8,580				16,500
	Antioch									8,590									49,890				7,020	15,610
	Kenosha (E)			5,750									8,810											14,560
	Wauconda						4,880										8,820			28,760				13,700
	McHenry (Alg)													8,080										8,080
	Kenosha (W)																		6,780					6,780
	Newport			4,890																			2,290	4,890
Total																								
Destinations	110,870	115,120	118,370	88,060	63,630	56,420	54,830	51,540	49,170	40,570	30,870	33,080	32,750	30,320	28,920	21,430	16,560	15,110	13,300	13,690	7,740	7,020	4,700	1,004,070

While trips between individual Lake County townships and subareas of the City of Chicago (as defined in the macro zones) were not large enough to be included in the Top 100 flows as summarized above, these trips remain a substantial market when aggregated (which is appropriate given the robust transportation infrastructure that serves these trips). Approximately 105,000 trips take place between the City of Chicago and Lake County.

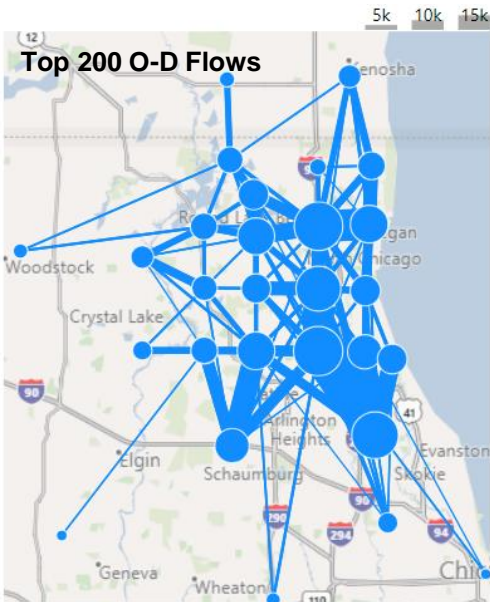
As shown in Figure 4-15, among trips to and from Chicago, the largest share are traveling to northwest Chicago (43 percent), followed by Chicago's Central Business District (21 percent) and north Chicago (17 percent, area east of the Chicago River North Branch and north of North Avenue). Among trips to northwest Chicago, nearly half are from townships along I-94. Trips to the CBD are driven largely by trips originating in the southernmost townships (i.e., Vernon, West Deerfield, Moraine), which are served by Metra. Trips to north Chicago have similar origination patterns as the Chicago CBD, with the addition of trips from Libertyville township.

Figure 4-15. Flows from Lake County to Chicago (StreetLight)¹



¹ All of the destinations are assigned to a single location to better illustrate Lake County origin locations. Two of the Chicago subareas are not mapped due to their smaller size.

Figure 4-16. Top 200 Inter-Zone Flows (StreetLight)



The top 200 origin-destination flows between macro zones is depicted in Figure 4-16 to illustrate the geography of some of the smaller origin-destination pairs. While it includes many of the smaller travel markets, the map highlights the primacy of several key flows:

- Along the I-94 corridor, with decreasing intensity moving northward;
- East-west along Waukegan-Gurnee-Greater Round Lake;
- Lake County to/from northeast and northwest Cook County.

The travel market between northeastern Cook County and Vernon, West Deerfield, and Moraine Townships is notably strong. The travel market between northwestern Cook County and Elmhurst, Elgin, and to a lesser extent Vernon Townships is rather smaller—though still substantial. It

should be noted, however, that these two Cook County macro zones are larger in area than the Lake County macro zones, which prevents apples-to-apples comparisons. Future analysis into detailed travel markets will incorporate density considerations into the findings.

4.4.4 Commuter Flows (StreetLight, Census LODES, CTPP)

A short summary of the differences between the StreetLight and Census data is included below. As described previously, these data sources are difficult to compare directly due to the differing years of data coverage and other considerations. The overall findings are as follows:

- According to StreetLight data, there are about **618,700** work commute trips traveling to, from, or within Lake County on a typical weekday, which is about 22.8 percent of the total 2.72 million weekday (Monday-Thursday) trips.
- CTPP data indicates that there are **716,800** commuter trips traveling to, from, or within Lake County (assuming a daily return trip for each worker assigned to the origin-destination pair, excluding those who work from home).
- Census LODES data indicates that there are **882,100** primary commuter trips, using the same geographic parameters. This figure includes only primary jobs to mitigate potentially overestimating the travel market in the case of multiple part-time jobs. It is not possible to exclude or correct this dataset for workers who work from home or at distributed worksites.

Despite being more recent than the two Census data sources, StreetLight estimates 14 percent to 30 percent fewer commutes (i.e., home-based work). Given that the StreetLight daily trip totals are generally in line with CMAP travel demand data, it appears likely that due to trip-chaining, some of what would in isolation be considered commutes are being reclassified as other trip purposes (e.g., when one drops off a child at daycare before going to work, or stops at the store on the way home from work). It is also worth noting that the Census commuter data may overcount for an “average day,” as there are a variety of reasons why a commuter may not travel to work on a given day—illness, business trips, vacations, etc.

However, there are some other differences between the datasets that are difficult to account for. As shown in Table 4-3, the StreetLight home-based work trips are far more local, with 33 percent starting and stopping within the same zone (i.e., intra-zone), and 64 percent of commute trips starting and ending within Lake County. The Census proportions, on the other hand, show about 10-15 percent of commute trips classified as intra-zone, and less than half of commute trips occur wholly within Lake County.

Table 4-3. Lake County Commute Trips By Data Source

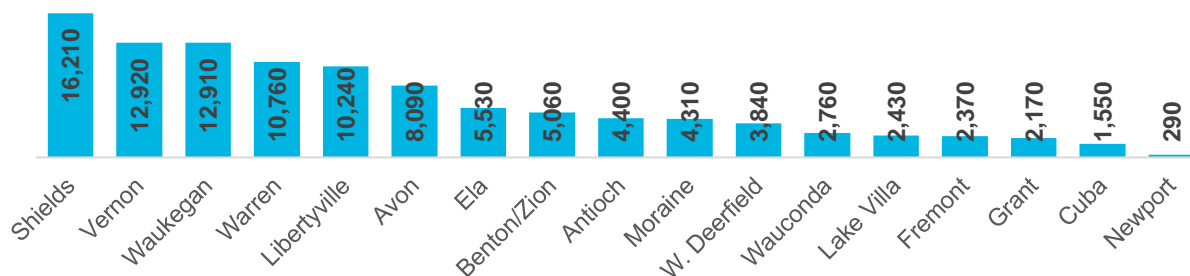
	StreetLight (2019)	CTPP (2012-2016)	LODES (2017)
Total Trips	2,719,430	-	-
Commuter Trips (Home-Based Work)	618,710	716,830	882,130
From Lake County	18%	25%	33%
To Lake County	18%	25%	33%
Within Lake County	64%	49%	34%
Intra-Zone	33%	15%	9%
Inter-Zone	67%	85%	91%

Several mechanisms may be impacting the under-reporting of long-distance trips in the StreetLight data. The machine learning algorithms of the StreetLight engine may be failing to include low-frequency origin-destination pairs, similar to how sampling error can lead to the omission of such trips in the CTPP data. As noted previously, discussion with StreetLight representatives confirmed that the higher number of short-distance trips may be due to artificial trip-breaking. When a device does not move five meters for five minutes, the trip is considered ended. Thus, stopping for coffee or getting stuck in a traffic jam or at a train crossing would incorrectly “end” many longer-distance commutes. In addition, the practice of calibrating mobile device movements to vehicle movements and roadway infrastructure does not clearly account for shared transportation—whether it be transit or carpooling.² Some people choose to reduce transportation costs for long-distance commutes by opting for shared transportation, and thus these trips are likely underreported in the StreetLight data.

Review and comparison between the datasets suggests the following approach for subsequent analysis: 1) assume total daily trips are accurately captured by StreetLight and 2) for commute flows, use the value that is reported by CTPP as it is a more conservative figure and is less susceptible to misrepresented workplace due to headquartering (i.e., from LODES). The fact that StreetLight data show that there has been little or slightly negative growth in trip volumes—at least at a macro scale—suggests that the “oldness” of the CTPP dataset is not a significant problem for this study area. This assumption may need to be revisited later in this study, when performing more detailed corridor analyses.

A summary of the 106,000 estimated CTPP commute trips that start and end within the same zone is shown in Figure 4-17. Shields Township (home of Naval Station Great Lakes) has the most intra-zone trips, though it may be over-reported due to the unusual nature of the local employment base. The next locations are with the greatest number of intra-zone trips (>10,000 trips) are Vernon, Waukegan, Warren, and Libertyville Townships.

Figure 4-17. Intra-Zone Commute Trips (CTPP)

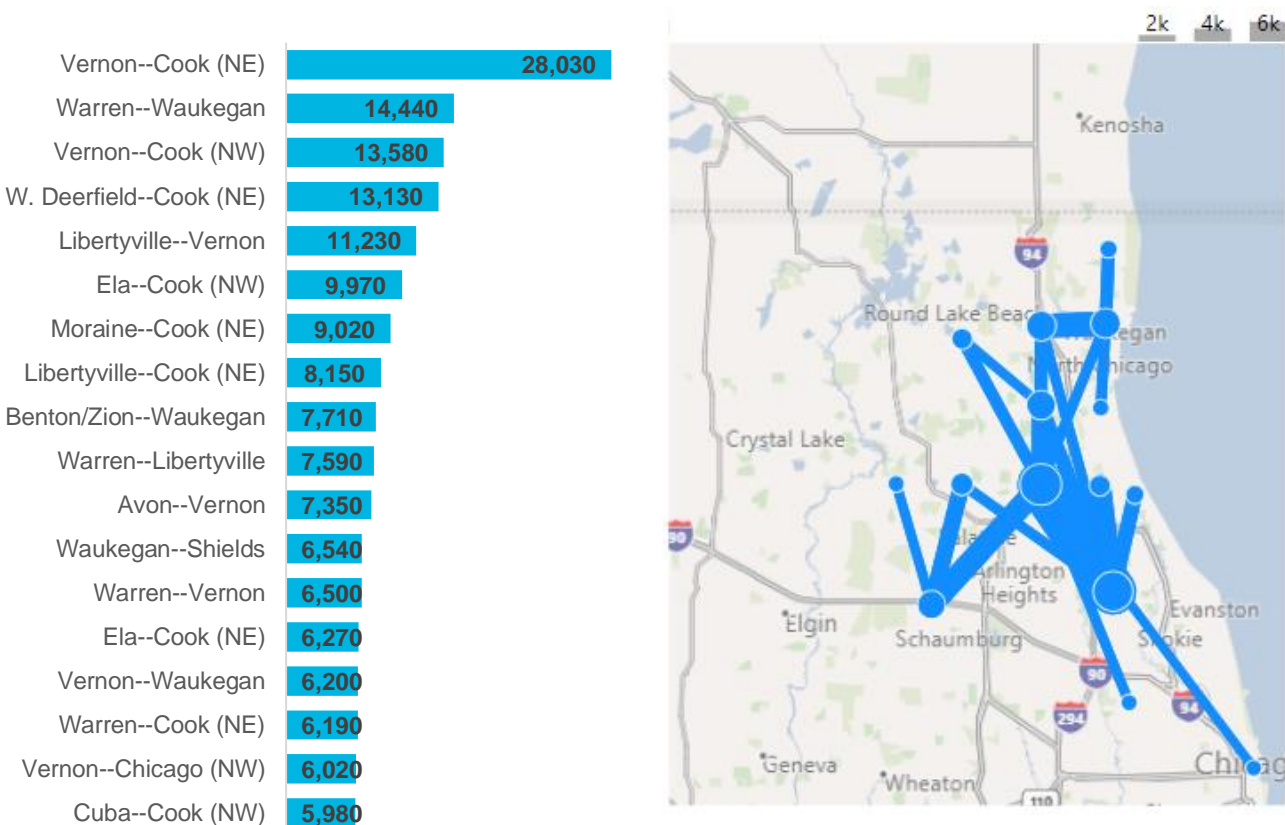


² Additional analysis into StreetLight Trip Index (devices) rather than StreetLight Trip Volume (vehicles) did not indicate that it would significantly correct for this problem. However, the detailed corridor analysis in following tasks will use the Index volumes.

The top origin-destination pairs as identified in the CTPP data are identified in Figure 4-18. Many of these are similar to the top origin-destination pairs for total trips, but several pairs are more relevant to the commuter market than the overall travel market. For example, while the following origin-destination pairs did not make the list of top overall travel flows, there are large number of commuters (>7,000) traveling between:

- Vernon Township—Cook (NW)
- Warren Township—Libertyville Township
- Libertyville Township—Cook (NE)
- Avon Township—Vernon Township

Figure 4-18. Inter-Zone Commuter Trips (CTPP)



Overall, the major travel markets at a macro scale, including both total trips and commuter trips, are provided in Figure 4-19. Inter-zone travel markets are more heavily represented by commute trips, with trips from Vernon Township to Cook County are strong examples. Conversely, trips within Grant, Ela, Warren Townships have a lower share of commute trips.

A geographic representation of all trips is provided in Figure 4-20. The panels of maps are split into commute trips and total trips, with the bubble maps showing the size of the intra-zone trips and the line widths representing the size of the inter-zone trips.

Analysis of these selected markets suggests the following thresholds be applied to a narrowed set of markets to advance to the next phase: origin-destination pairs with at least 25,000 average daily trips and 5,000 commute trips.

Figure 4-19. Selected Total and Commute Flows (StreetLight and CTPP)

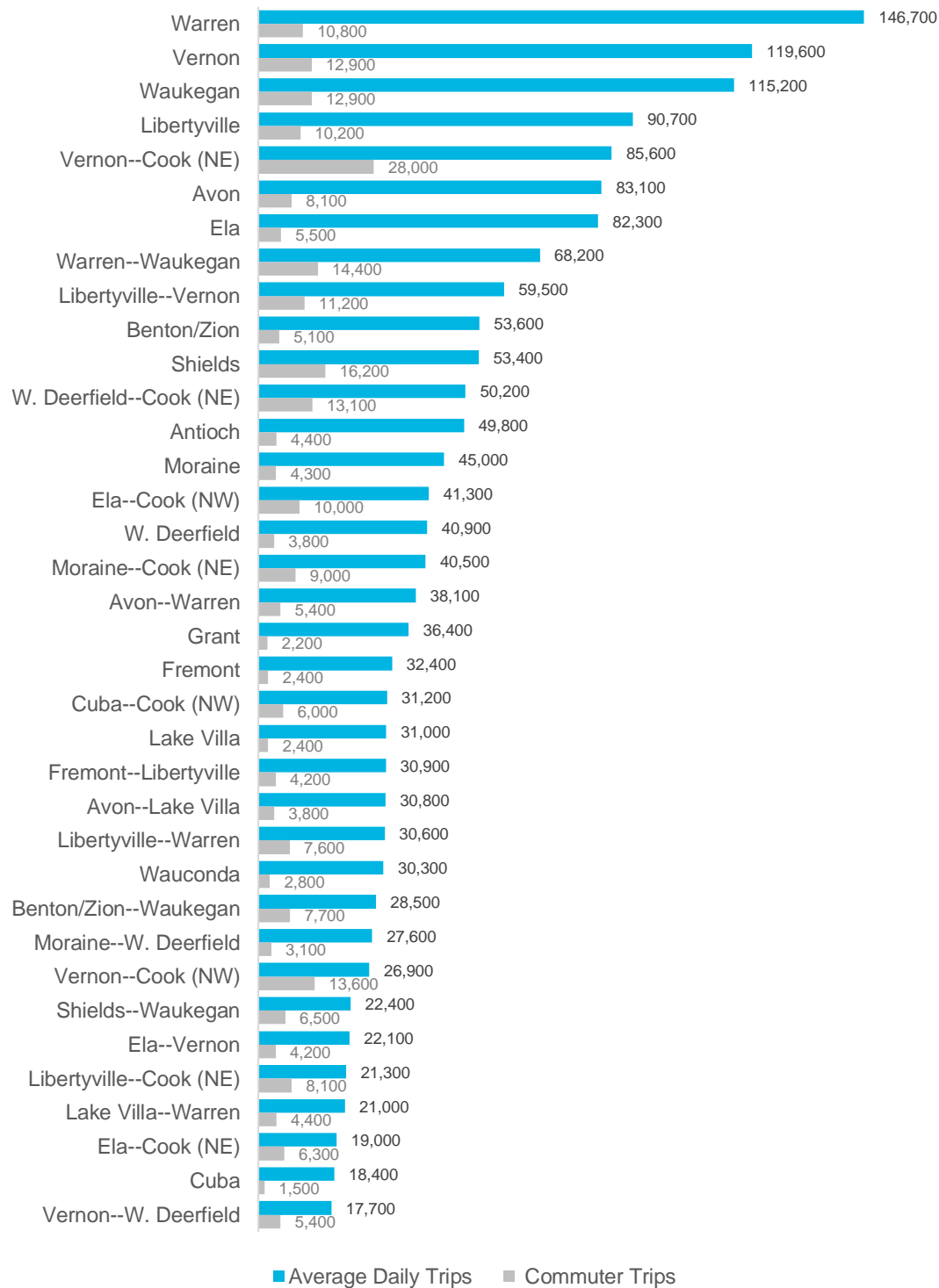
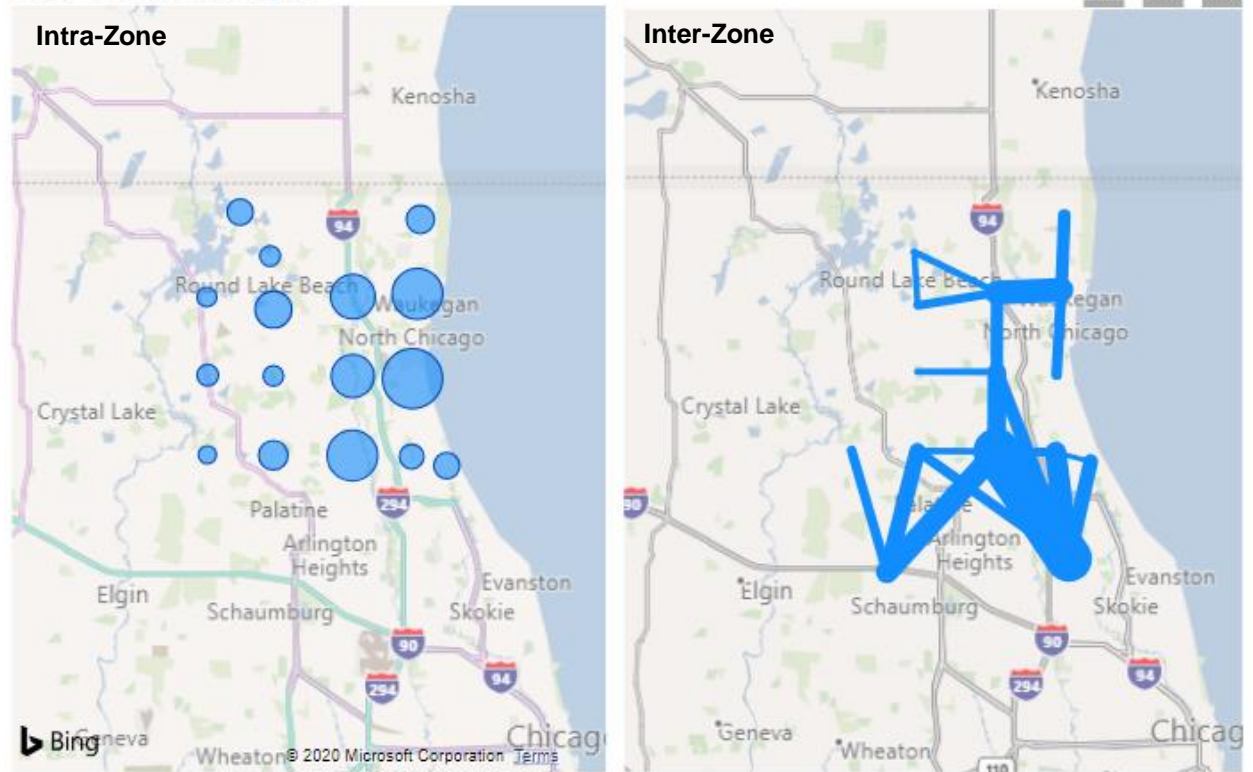
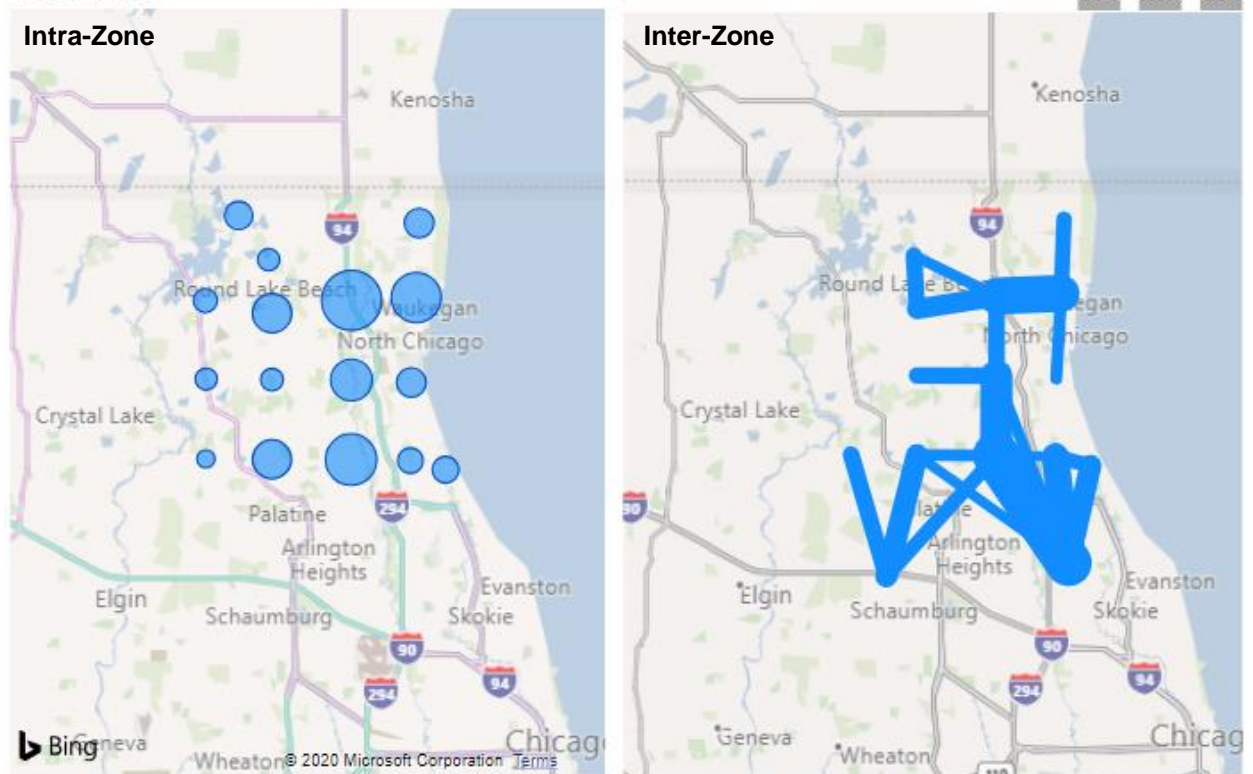


Figure 4-20. Selected Markets, Intra-Zone and Inter-Zone Flows (CTPP and StreetLight)

CTPP Commuter Trips



Total Trips



4.4.5 Mode share

The CTPP data is the only origin-destination data source that includes information about mode choice. According to the dataset, 21,935 (7.3 percent) of the 380,350 of commuters primarily work from home. The following analysis excludes those workers and focuses on the remaining 716,800 trips (i.e., double the number of non-telework commuters to approximate a round-trip weekday commute as two one-way trips).

Among workers who did not work at home, 606,000 work trips (84.6 percent) use single-occupancy vehicles. Carpooling is the next most common at 56,000 (7.8 percent), followed by railroad (i.e., commuter rail) (24,400, or 3.4 percent), walking (16,300, or 2.3 percent), and bus (4,800, or 0.7 percent).

There can be significant variations in mode split among different origin and destination pairs, though typically there are more than 75 percent SOV travelers among the major origin-destination pairs. Exceptions include locations with a great deal of commuters traveling to/from downtown Chicago by Metra (Moraine, West Deerfield, and Vernon townships), and commutes that start and end in Shields Townships, among which 60 percent are carried out on foot—likely the result of the Naval Station Great Lakes. Aside from downtown Chicago, there are a substantial proportion of commuters traveling from Avon township to NE Cook via railroad (9 percent), and other railroad origin-destination pairs capturing 1-3 percent of trips (including both reverse commutes and intermediate trips).

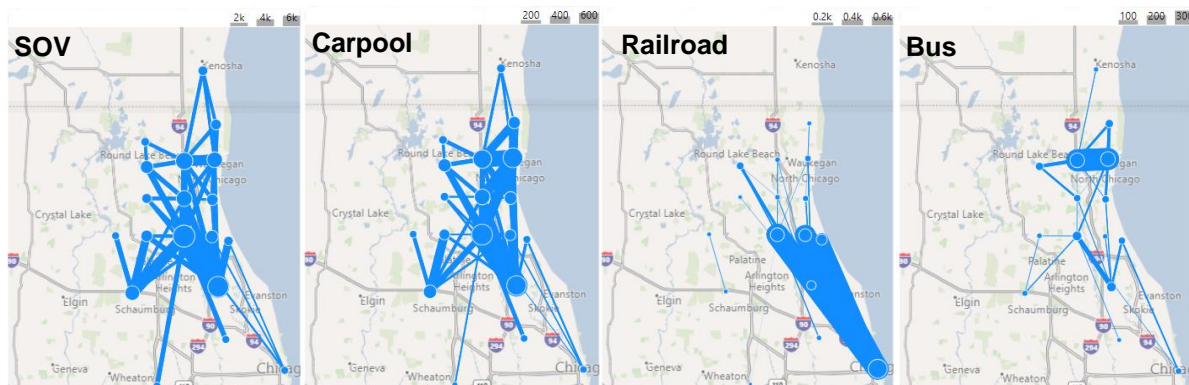
Among top origin-destination pairs, carpool shares range from 2 percent to 24 percent, with the greatest numbers occurring to and from Waukegan Township, as well as Benton/Zion to Warren Township, Warren to Shields Township, and trips to and from NE and NW Cook County.

Only a handful of the top origin-destination pairs can claim a bus mode share over 2 percent: Waukegan to Warren (8 percent), intra Waukegan (5 percent), Avon to Warren (4 percent), and Warren to Waukegan (3 percent).

The share of non-motorized travel is low overall, but it is most common in Shields township as well as in West Deerfield, Benton/Zion, Moraine, and Waukegan Townships. Bike mode share never reaches above 2 percent, as seen in West Deerfield Township.

An illustration of trips between zones by travel mode is provided in Figure 4-21.

Figure 4-21. Top 100 Inter-Zone Commute Flows by Mode (CTPP)



5 TRANSPORTATION SERVICES AND FACILITIES

This Section provides an overview of transportation services and facilities in Lake County by mode, including roadways, transit providers, non-motorized, and other transportation types. Together, these modes comprise the Lake County transportation network. A comprehensive review of existing and future conditions offers insight toward SOV solutions.

5.1 ROADWAYS

5.1.1 Infrastructure

The system of roads in Lake County includes a hierarchical network of streets and highways, totaling 3,400 miles. Functional classification helps to identify roadway jurisdiction in Lake County for potential policy or infrastructure improvements related to SOV reduction measures. The following agencies responsible for roadways in the County include:

- **State System:** State primary routes, which are highways signed as Interstate State, United States, and Illinois, excluding the Toll System. State supplementary routes includes all other highways with the jurisdictional responsibility of the State.
- **Toll System:** Roadways under the jurisdictional responsibility of the Illinois State Toll Highway Authority (ISTHA). In Lake County, these include I-94 (24.21 miles) and I-294 (0.23 miles).
- **County System:** Highways under the jurisdictional responsibility of the Lake County Division of Transportation.
- **Municipal Street System:** Roadways located within municipalities that are not part of the State, County, or Toll systems.
- **Township/Road District System:** Remaining roadways that are not included in any of the preceding systems.

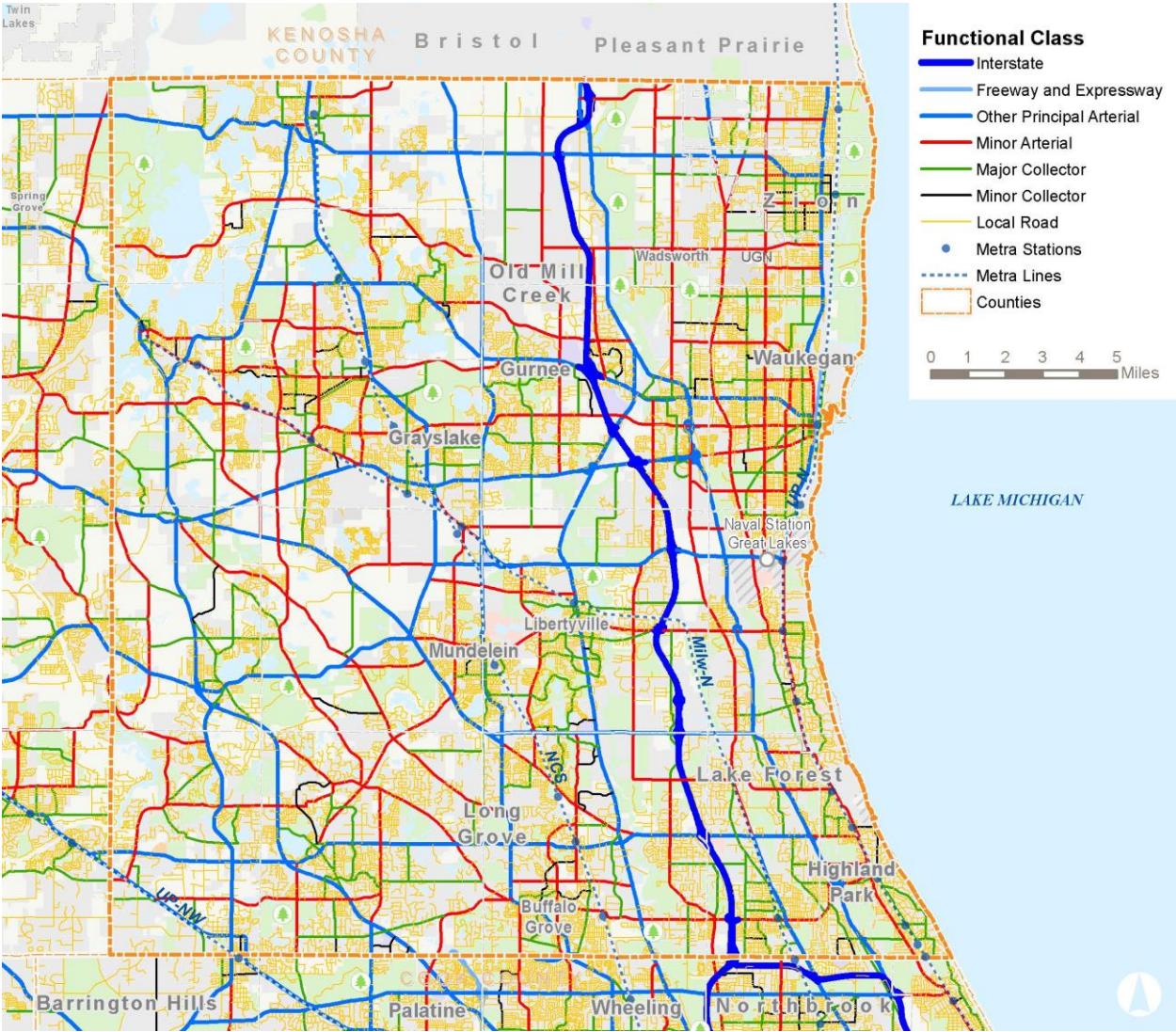
Table 5-1 shows roadway mileage in the County by system and functional classification. As can be seen, local streets account for over 70 percent of total roadway miles. Figure 5-1 illustrates the designated functional classifications in Lake County. Figure 5-2 provides the annual average daily traffic (AADT) counts in Lake County.

Table 5-1. Lake County Roadway Miles by System and Functional Classification

Functional Classification	State System		State Toll Highway Authority	Local Highway Systems			Total	Percent of Total
	Primary	Supplementary		Lake County	Township	Municipal		
Interstate	1.1	0.0	24.4	0.0	0.0	0.0	25.6	0.8%
Freeway/Expressway	3.1	0.0	0.0	0.0	0.0	0.0	3.1	0.1%
Other Principal Arterial	245.8	5.3	0.0	2.1	0.0	0.0	253.2	7.5%
Minor Arterial	49.3	15.3	0.0	236.4	8.5	53.5	362.9	10.7%
Major Collector	0.0	4.1	0.0	46.7	20.1	203.1	273.9	8.1%
Minor Collector	0.0	1.6	0.0	1.3	5.2	37.7	45.7	1.4%
Local	0.0	2.1	0.0	2.1	462.1	1,949.9	2,416.2	71.5%
Total All Classes	299.3	28.2	24.4	288.5	495.9	2,244.2	3,380.6	100.0%

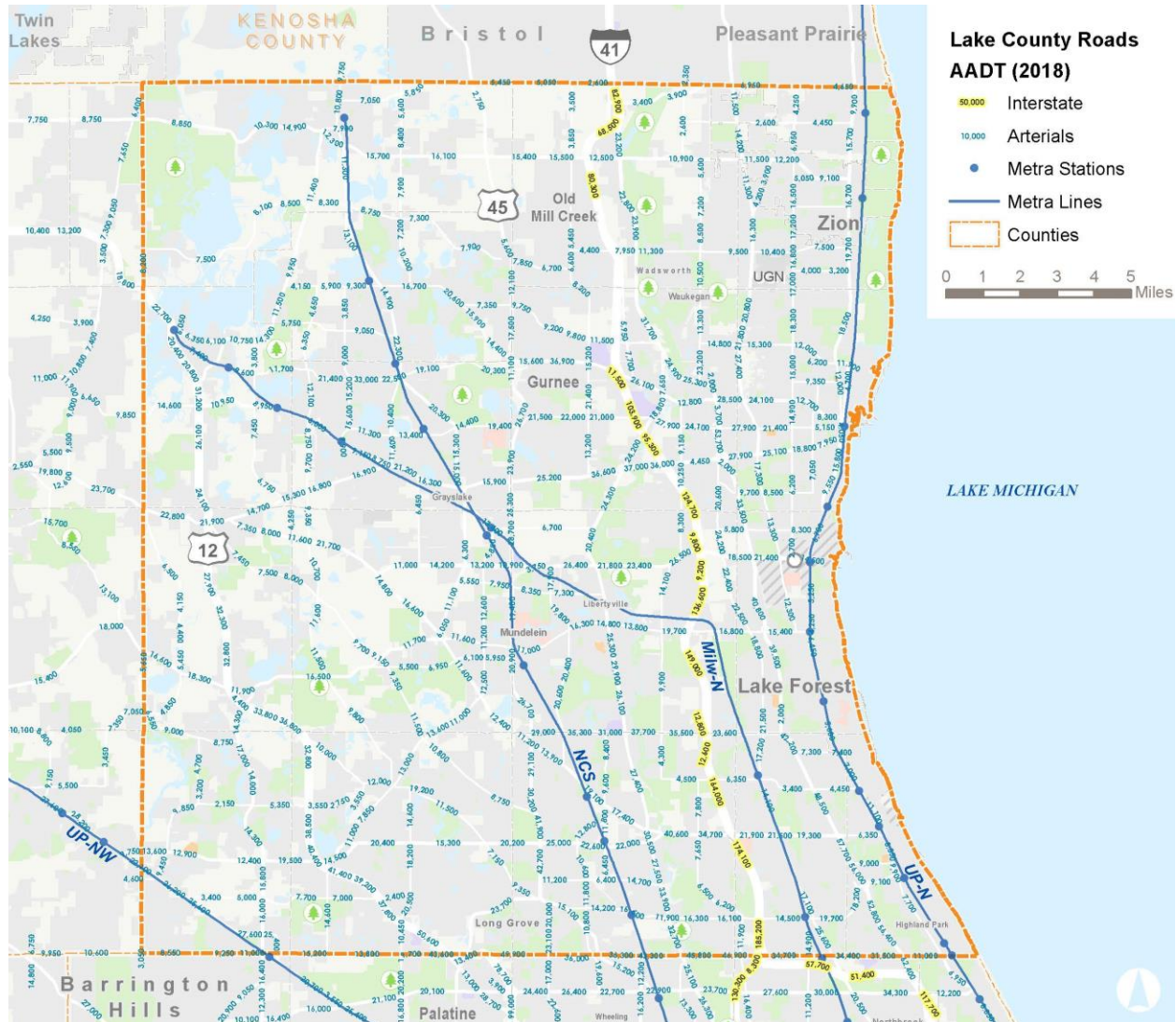
Source: IDOT 2018 Illinois Highway and Street Mileage Statistics.

Figure 5-1. Functional Classification of Lake County Roadways



Source: IDOT 2018.

Figure 5-2. Annual Average Daily Traffic



Source: IDOT 2018 Illinois Highway and Street Mileage Statistics.

5.1.2 Congestion

Information on current and future roadway congestion in Lake County was excerpted from the analysis performed as part of the Tri-County Access (TCA) Project by the ISTHA. The TCA study area included all of Lake County and parts of Kenosha, McHenry, and Cook Counties. The TCA evaluation of daily travel focused on conditions during the morning peak between 6 a.m. and 10 a.m., and in the afternoon/evening between 2 p.m. and 8 p.m. The analysis used volume-to-capacity ratios to assess congestion levels from moderate to extreme as follows: Level of Service (LOS) D (moderate congestion), LOS E (severe), and LOS F (extreme). In assessing roadway performance, congestion was measured as the percentage of VMT spent in congested conditions during the peak periods.

Congestion was evaluated for two time periods: 2015, representing base year conditions, and 2050, representing future year conditions. The future transportation network used for the 2050 congestion analysis assumed the CMAP's No-Build Alternative, which included 1) fiscally constrained Regionally Significant Projects (RSPs) in CMAP's *ON TO 2050 Comprehensive Regional Plan*, 2) programmed roadway, transit, and aviation projects listed in the current Transportation Improvement Program (TIP), and 3) projects not part of the current TIP but that are expected to be funded and completed by 2050.

Figure 5-3 and Figure 5-4 display 2015 congestion versus Figure 2050 modeled congestion levels.

Figure 5-3. Congestion (2015)



Figure 5-4. Congestion (2050)



Source: Tri-County Access Executive Report (January 2020).

Table 5-2 presents daily modeled VMT from the TCA Study for 2015 and 2050. The analysis shows that No-Build 2050 travel on congested roadways will more than double from base-year levels.

Table 5-2. Congested VMT in Tri County Access Study Area - Peak Travel (in 000s of Miles Traveled)

Functional Class	2015		2050		Change in Congested	% Chg. in Congested
	Total	Congested	Total	Congested		
Freeway/Tollway/Expressway	7,088	1,796	8,884	3,817	2,021	113%
Principal Arterial	9,221	1,885	11,432	3,795	1,910	101%
Minor Arterial	5,814	924	7,429	2,054	1,130	122%
Collector	2,340	310	3,400	940	630	203%
Total	24,462	4,914	31,144	10,606	5,691	116%
Percent Congested	20%		34%			

Source: Tri-County Access Report (January 2020).

5.1.3 Planned and Programmed Roadway Improvements

According to Lake County's 2019-2024 Highway Improvement Program, the priorities of the County are a balance between preservation, modernization, and expansion. Projects are planned with the primary aim of addressing travel flow issues in Lake County. Priorities for funding consideration include:

- **System Preservation Projects:** Keep county highway pavements, bridges, bikeways and signals and related items in good condition.
- **System Modernization Projects:** Reduce delays and increase safety by accommodating short-term traffic growth and the needs of non-motorists.
- **System Expansion Projects:** Provide highway capacity to meet long-term traffic growth needs and provide for economic development.

Program funding distribution across the three categories for projects earmarked for multi-year 2019-2024 period includes 24 percent toward preservation projects, 33 percent modernization, 34 percent expansion projects, and 9 percent for debt service. Among the 2020 projects, modernization accounts for 45 percent of project funding.

Sales tax is the primary funding source for the 2019-2024 Highway Improvement Plan, accounting for over half (55 percent) of the program funding. Other sources include Motor Fuel Tax (15 percent), Federal (13 percent), matching tax (10 percent), County bridge tax (5 percent), bonds (1 percent), and other (1 percent). Lake County obtains Federal funds that flow through, and are administered by, IDOT.

Table 5-3 provides a list of the top Lake County projects by total cost as provided in the 2019-2024 Lake County Highway Improvement Plan.

Table 5-3. Top Lake County Roadway Projects (2019-2024 Highway Improvement Plan)

Route	Category	Description	Program Date
Deerfield Rd	Roadway Expansion	Reconstruct and widening from Saunders Road to west of IL 21	28-Mar-2022
US Route 45	Roadway Expansion	Millburn Community Preservation Bypass Improvement	27-Apr-2018
Quentin Rd	Roadway Expansion	Add-Lanes Project (Stage 2) from White Pine to south of IL 22	27-Apr-2018
Buffalo Grove Rd	Roadway Expansion	Reconstruction and widening from IL 22 to Deerfield Pkwy	1-Jan-2020
Weiland Rd	Roadway Expansion	Stage II of IV: Part of Buffalo Grove Transp. Agreement	26-Apr-2019
14th St	Roadway Modernization	Reconstruction from IL 131 to Jackson St	18-Jan-2019
Gilmer Rd	Intersection Modernization	Intersection widening @ Midlothian Rd	1-Jan-2021
Weiland Rd	Roadway Expansion	Stage III of IV: Weiland Rd expansion project	20-Sep-2019
Cedar Lake Rd @ Round Lake	Roadway Expansion	Village of Round Lake Downtown Development Plan	1-Jan-2023
Quentin Rd	Roadway Expansion	Gas Main (Nicor) relocation from White Pine to IL 22	27-Apr-2018

Source: 2019-2024 Lake County Highway Improvement Plan .

5.2 METRA

5.2.1 Metra Service, Infrastructure, and Demand

Metra is the service mark for the commuter rail system serving the Chicago metropolitan area. The agency provides service to and from downtown Chicago with 242 stations over 11 routes totaling nearly 500 route miles and approximately 1,200 miles of track. Metra operates 700 weekday trains, serving nearly 290,000 passenger trips each weekday. Metra owns and operates four rail lines (Rock Island, Metra Electric, Milwaukee District North and Milwaukee District West). Three Metra lines are operated by Metra employees over freight railroad-owned track through trackage rights or lease agreements (Heritage Corridor, North Central Service and SouthWest Service). Four additional Metra lines are operated directly by freight railroads through purchase-of-service agreements (BNSF, Union Pacific North, Union Pacific Northwest and Union Pacific West).

Metra's principal travel market is serving work trips to downtown Chicago. Metra has focused efforts at garnering larger market shares of the non-work, reverse commute, and intermediate (i.e., passenger trips between non-downtown Chicago stations) travel markets.

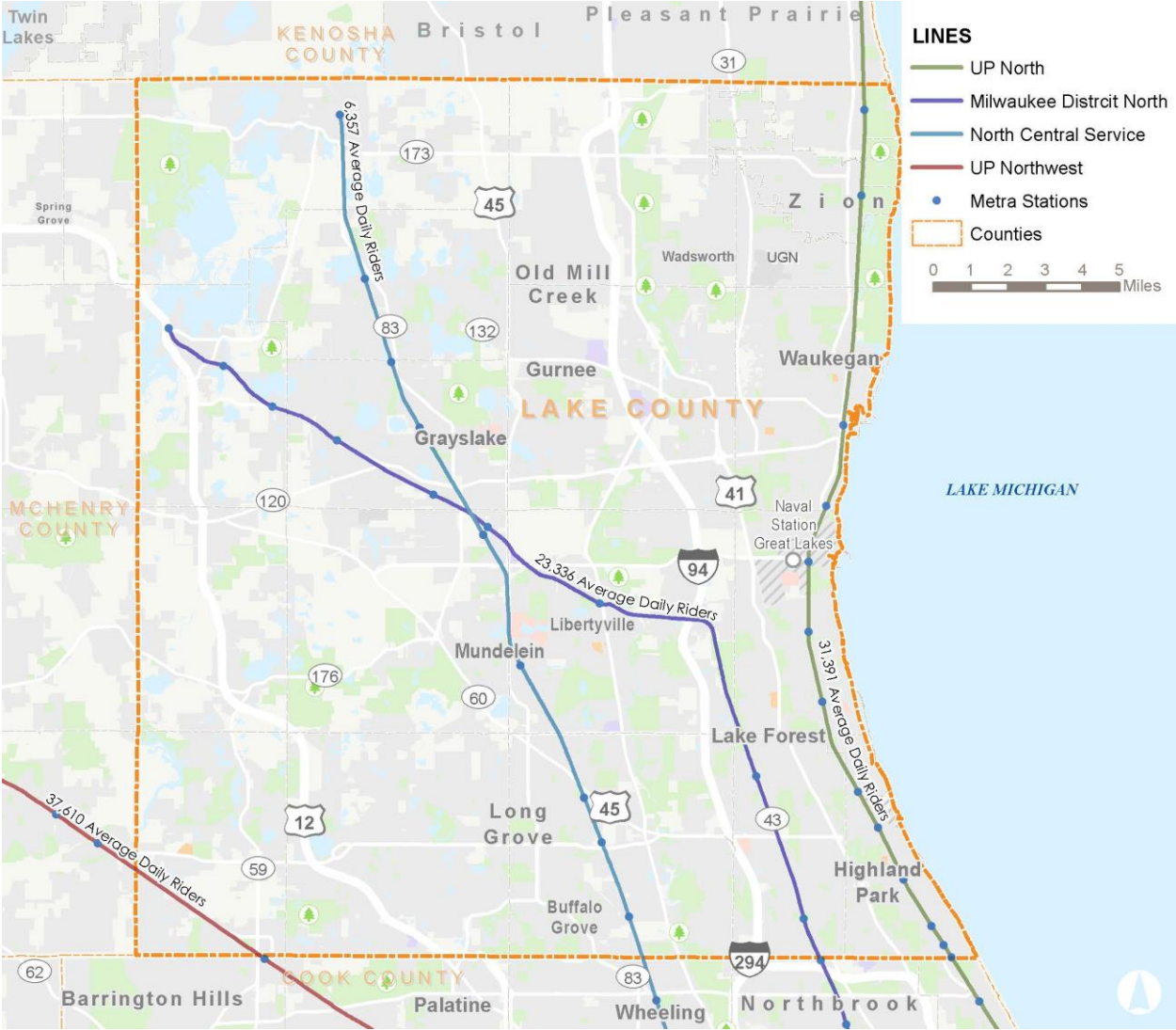
Lake County is directly served by three rail lines: Milwaukee District North (MD-N), North Central Service (NCS), and Union Pacific North (UP-N). A fourth line, the Union Pacific Northwest (UP-NW), crosses the southwest corner of the County, and includes one station (Barrington) accessible to County commuters. Key characteristics of these lines are provided on Table 5-4. The 32 stations in Lake County include the Lake Cook Road Station on the MD-N, which is located at the border with Cook. Figure 5-5 shows a map of the four routes that serve Lake County.

Table 5-4. Description of Metra Lines Serving Lake County

Line	Outlying Terminal	Downtown Terminal	Stations	Stations in Lake	Route Miles	Trains per Day			2019 On-Time %
						Wkday	Sat.	Sun.	
UP-N	Kenosha, WI	Ogilvie	25	12	51.6	70	26	18	95.3%
MD-N	Fox Lake	Union	20	10	49.5	83	20	18	91.9%
NCS	Antioch	Union	12	9	52.8	20	0	0	94.3%
UP-NW	Harvard / McHenry	Ogilvie	22	1	63.1 / 7.3	65	34	21	93.0%

Source: Metra.

Figure 5-5. Lake County Metra Service



Source: Metra.

Metra categorizes trains by service period and direction, as shown in Table 5-5. The times are based on inbound arrivals at a downtown terminal and outbound departures from a downtown terminal. These groupings generally correlate with unique travel markets, with Peak trains used by riders making the traditional suburban to downtown work commute, Reverse trains to suburban work destinations, and Off-Peak trains typically for non-work purposes.

Table 5-5. Metra Service Categories

Peak	AM Peak Inbound	Start of Service - 9:15a
	PM Peak Outbound	3:30p - 6:45p
Reverse	AM Peak Outbound	Start of Service - 9:15a
	PM Peak Outbound	3:30p - 6:45p
Off-Peak	Midday Inbound	9:16a - 3:29p
	Midday Outbound	9:16a - 3:29p
	Evening Inbound	6:46p - End of Service
	Evening Outbound	6:46p - End of Service

Source: Metra.

These service categories are used in breaking down the number of weekday scheduled stations stops at Lake County stations, as presented in Table 5-6. The number of stops represents a measure of the level of service for the line.

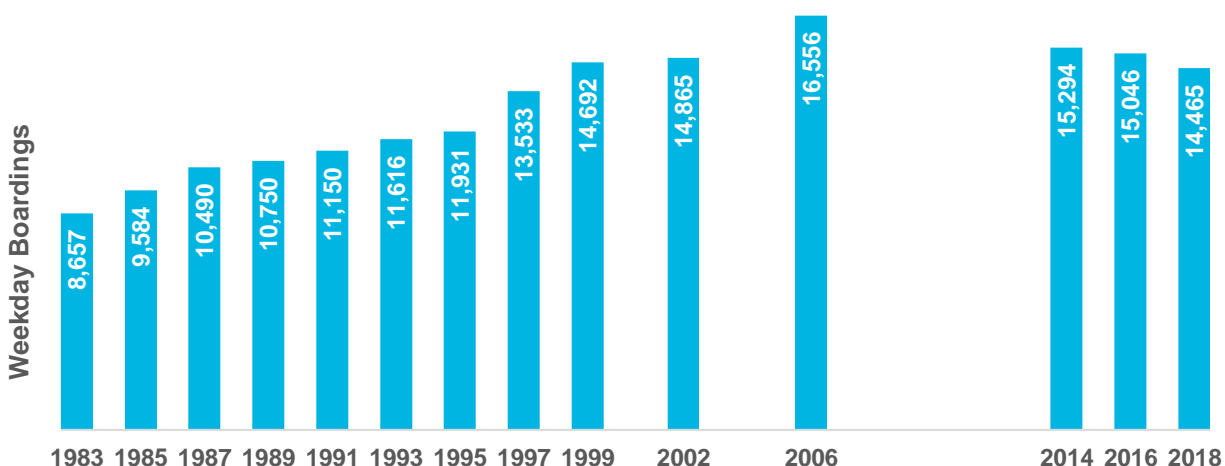
Table 5-6. Number of Weekday Station Stops by Lake County Station

Station	Mile Post	Line	Date of Timetable	Weekday Station Stops		
				Peak	Reverse	Off-Peak
Winthrop Harbor	44.5	UP-N	9-Apr-18	10	2	6
Zion	42.1	UP-N	9-Apr-18	10	2	6
Waukegan	35.9	UP-N	9-Apr-18	23	7	23
North Chicago	33.7	UP-N	9-Apr-18	20	7	23
Great Lakes	32.0	UP-N	9-Apr-18	16	7	23
Lake Bluff	30.2	UP-N	9-Apr-18	21	7	23
Lake Forest	28.3	UP-N	9-Apr-18	21	7	23
Fort Sheridan	25.7	UP-N	9-Apr-18	18	6	23
Highwood	24.5	UP-N	9-Apr-18	15	6	23
Highland Park	23.0	UP-N	9-Apr-18	24	10	24
Ravinia	21.5	UP-N	9-Apr-18	18	7	24
Braeside	20.5	UP-N	9-Apr-18	17	10	24
Fox Lake	49.5	MD-N	04-Nov-19	18	4	14
Ingleside	47.8	MD-N	04-Nov-19	14	3	14
Long Lake	46.0	MD-N	04-Nov-19	15	3	14
Round Lake	44.0	MD-N	04-Nov-19	15	4	14
Grayslake	41.0	MD-N	04-Nov-19	16	6	21
Prairie Crossing/Libertyville	39.2	MD-N	04-Nov-19	15	5	21
Libertyville	35.5	MD-N	04-Nov-19	19	6	23
Lake Forest	28.4	MD-N	04-Nov-19	19	9	23
Deerfield	24.2	MD-N	04-Nov-19	23	13	24
Lake Cook Road	23.0	MD-N	04-Nov-19	20	12	24
Antioch	52.8	NCS	04-Nov-19	9	4	7
Lake Villa	48.2	NCS	04-Nov-19	9	4	7
Round Lake Beach	45.9	NCS	04-Nov-19	9	4	7
Washington St.	43.9	NCS	04-Nov-19	9	4	7
Prairie Crossing/Libertyville	40.7	NCS	04-Nov-19	9	4	6
Mundelein	36.9	NCS	04-Nov-19	9	4	6
Vernon Hills	33.0	NCS	04-Nov-19	9	4	6
Prairie View	31.6	NCS	04-Nov-19	9	4	6
Buffalo Grove	29.5	NCS	04-Nov-19	9	4	6
Barrington	31.9	UP-NW	3-Sep-19	30	8	22

Source: Metra.

Metra measures station ridership using periodic counts of passengers boarding and alighting each station and each train over the course of a full-service day. Figure 5-6 provides the trend in Lake County Metra station weekday boardings. The most recent count was made in fall 2018. Total boardings were aggregated for the 32 Lake County stations for each of the counts made dating back to 1983. County station boardings peaked in 2006 and have since trended downward.

Figure 5-6. Total Lake County Metra Stations Weekday Boardings¹



Source: Metra.

¹ Gaps in the chart are because no count was performed by Metra that year.

Table 5-7 summarizes 2018 boardings and alightings of the 32 Lake County stations by service period and direction. The orange highlights represent the traditional commute travel market and accounted for over 60 percent of weekday riders in 2018. Reverse commuter riders accounted for 16 percent of riders (blue highlighted). Midday and Evening shares were somewhat lower.

Table 5-7. Lake County Summary of Metra Boardings and Alightings by Service Period (2018)

	Inbound		Outbound		Total	
	Ons	Offs	Ons	Offs	Ons	Offs
AM Peak	9,317	282	77	2,359	9,394	2,641
Midday	1,785	100	115	1,347	1,900	1,447
PM Peak	2,312	82	307	9,009	2,619	9,091
Evening	498	39	54	1,180	552	1,219
Total	13,912	503	553	13,895	14,465	14,398
AM Peak	64%	2%	1%	16%	65%	18%
Midday	12%	1%	1%	9%	13%	10%
PM Peak	16%	1%	2%	63%	18%	63%
Evening	3%	0%	0%	8%	4%	8%
Total	96.2%	3.5%	3.8%	96.5%	100.0%	100.0%

Source: Metra.

Table 5-8 presents 2018 boardings and alignments by the three service categories (i.e., Peak, Reverse, and Off-Peak) and totals for each of the 32 stations.

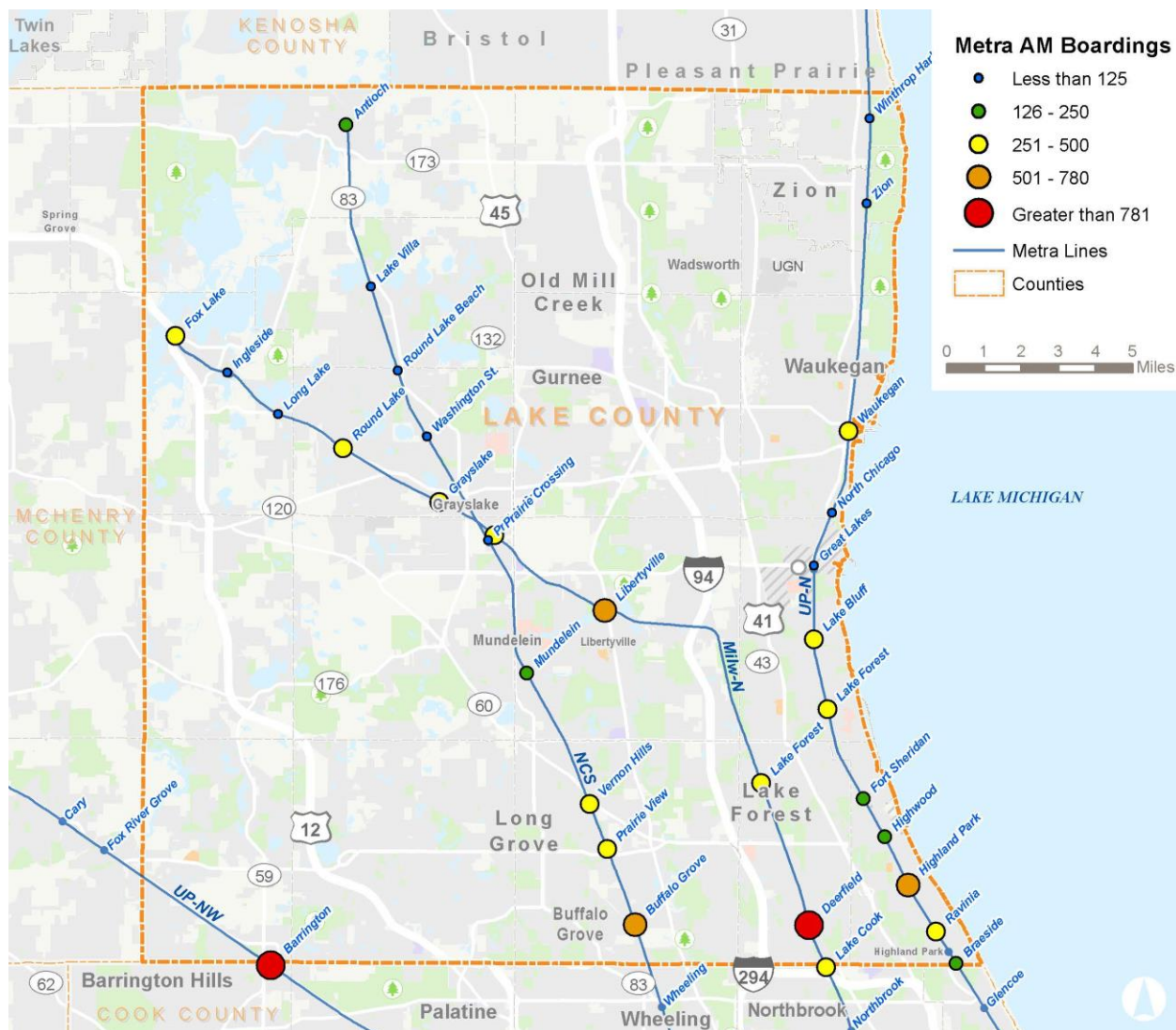
Table 5-8. Lake County Summary of Metra Boardings and Alightings by Line (2018)

Station	Line	Peak Direction				Reverse Direction				Off-Peak In + Out		Total Weekday	
		AM Peak In		PM Pk Out		AM Pk Out		PM Peak In		On	Off	On	Off
		On	Off	On	Off	On	Off	On	Off				
Winthrop Hrbr	UP-N	52	0	0	70	0	1	4	0	3	2	59	73
Zion	UP-N	91	1	2	86	1	6	5	0	11	9	110	102
Waukegan	UP-N	378	10	24	379	2	93	96	1	264	254	764	737
No. Chicago	UP-N	55	3	1	57	1	82	65	0	48	35	170	177
Great Lakes	UP-N	71	7	9	51	1	109	92	7	89	47	262	221
Lake Bluff	UP-N	241	7	5	239	2	315	291	3	108	77	647	641
Lake Forest	UP-N	331	30	30	328	4	253	204	3	178	105	747	719
Fort Sheridan	UP-N	185	4	7	165	4	30	33	4	30	44	259	247
Highwood	UP-N	127	4	11	88	14	26	24	12	66	94	242	224
Highland Park	UP-N	590	41	31	585	24	181	191	16	169	148	1,005	971
Ravinia	UP-N	248	4	5	198	7	9	15	5	51	33	326	249
Braeside	UP-N	189	9	4	191	4	145	160	4	53	30	410	379
Fox Lake	MD-N	267	0	0	215	0	4	13	0	42	80	322	299
Ingleside	MD-N	54	0	0	52	0	0	3	0	6	16	63	68
Long Lake	MD-N	80	1	0	84	0	1	1	0	12	18	93	104
Rnd Lake Bch	MD-N	309	1	0	270	0	9	38	0	48	126	395	406
Grayslake	MD-N	384	2	1	384	0	11	23	0	62	121	470	518
Prairie Crossing	MD-N	284	5	2	305	0	21	9	2	73	64	368	397
Libertyville	MD-N	573	13	17	512	2	39	60	7	149	182	801	753
Lake Forest	MD-N	368	11	10	386	1	176	130	1	98	108	607	682
Deerfield	MD-N	714	14	49	807	3	155	225	5	142	195	1,133	1,176
Lake Cook Rd	MD-N	350	60	46	495	0	480	416	4	274	154	1,086	1,193
Antioch	NCS	153	0	0	112	0	4	11	0	28	73	192	189
Lake Villa	NCS	106	0	0	75	0	4	3	1	21	40	130	120
Round Lake	NCS	95	0	0	78	0	1	8	0	8	12	111	91
Washington St.	NCS	66	0	0	61	0	5	7	0	13	18	86	84
Prairie Crossing	NCS	76	4	4	62	0	18	4	0	3	29	87	113
Mundelein	NCS	228	10	1	193	1	16	14	3	32	72	276	294
Vernon Hills	NCS	353	6	0	280	0	10	16	0	40	69	409	365
Prairie View	NCS	378	6	5	352	1	11	4	0	27	68	415	437
Buffalo Grove	NCS	576	13	15	491	1	51	37	1	66	81	695	637
Barrington	UP-NW	1,345	16	28	1,358	4	93	110	3	238	262	1,725	1,732
Totals		9,317	282	307	9,009	77	2,359	2,312	82	2,452	2,666	14,465	14,398

Source: Metra.

Figure 5-7 provides a map of Lake County Metra stations with weekday AM boardings categorized into five ranges. These are representative of the traditional Metra commuter market, with most riders destined for downtown Chicago.

Figure 5-7. Lake County Metra Station Boardings (2018)



Source: Metra.

Table 5-9. Lake County Station Rankings (2018)

Total Boardings				AM Peak Inbound Boardings				AM Peak Outbound Alightings			
Station		Line	Ons	Station		Line	Ons	Station		Line	Offs
1	Barrington	UP-NW	1,487	1	Barrington	UP-NW	1,345	1	Lake Cook Rd	MD-N	480
2	Deerfield	MD-N	991	2	Deerfield	MD-N	714	2	Lake Bluff	UP-N	315
3	Highland Park	UP-N	836	3	Highland Park	UP-N	590	3	Lake Forest	UP-N	253
4	Lake Cook Rd	MD-N	812	4	Buffalo Grove	NCS	576	4	Highland Park	UP-N	181
5	Libertyville	MD-N	652	5	Libertyville	MD-N	573	5	Lake Forest	MD-N	176
6	Buffalo Grove	NCS	629	6	Grayslake	MD-N	384	6	Deerfield	MD-N	155
7	Lake Forest	UP-N	569	7	Waukegan	UP-N	378	7	Braeside	UP-N	145
8	Lake Bluff	UP-N	539	8	Prairie View	NCS	378	8	Great Lakes	UP-N	109
9	Lake Forest	MD-N	509	9	Lake Forest	MD-N	368	9	Waukegan	UP-N	93
10	Waukegan	UP-N	500	10	Vernon Hills	NCS	353	10	Barrington	UP-NW	93
11	Grayslake	MD-N	408	11	Lake Cook Rd	MD-N	350	11	No. Chicago	UP-N	82
12	Prairie View	NCS	388	12	Lake Forest	UP-N	331	12	Buffalo Grove	NCS	51
13	Vernon Hills	NCS	369	13	Round Lake	MD-N	309	13	Libertyville	MD-N	39
14	Braeside	UP-N	357	14	Pra Crossing	MD-N	284	14	Fort Sheridan	UP-N	30
15	Round Lake	MD-N	347	15	Fox Lake	MD-N	267	15	Highwood	UP-N	26
16	Pra Crossing	MD-N	295	16	Ravinia	UP-N	248	16	Pra Crossing	MD-N	21
17	Fox Lake	MD-N	280	17	Lake Bluff	UP-N	241	17	Pra Crossing	NCS	18
18	Ravinia	UP-N	275	18	Mundelein	NCS	228	18	Mundelein	NCS	16
19	Mundelein	NCS	244	19	Braeside	UP-N	189	19	Grayslake	MD-N	11
20	Fort Sheridan	UP-N	229	20	Fort Sheridan	UP-N	185	20	Prairie View	NCS	11
21	Highwood	UP-N	176	21	Antioch	NCS	153	21	Vernon Hills	NCS	10
22	Great Lakes	UP-N	173	22	Highwood	UP-N	127	22	Ravinia	UP-N	9
23	Antioch	NCS	164	23	Lake Villa	NCS	106	23	Round Lake	MD-N	9
24	No. Chicago	UP-N	122	24	Rnd Lake Bch	NCS	95	24	Zion	UP-N	6
25	Lake Villa	NCS	109	25	Zion	UP-N	91	25	Washington St.	NCS	5
26	Rnd Lake Bch	NCS	103	26	Long Lake	MD-N	80	26	Fox Lake	MD-N	4
27	Zion	UP-N	99	27	Pra Crossing	NCS	76	27	Antioch	NCS	4
28	Pra Crossing	NCS	84	28	Great Lakes	UP-N	71	28	Lake Villa	NCS	4
29	Long Lake	MD-N	81	29	Washington St.	NCS	66	29	Winthrop Hrbr	UP-N	1
30	Washington St.	NCS	73	30	No. Chicago	UP-N	55	30	Long Lake	MD-N	1
31	Ingleside	MD-N	57	31	Ingleside	MD-N	54	31	Rnd Lake Bch	NCS	1
32	Winthrop Hrbr	UP-N	56	32	Winthrop Hrbr	UP-N	52	32	Ingleside	MD-N	0
Lake Co. Median Station (32)			288				245				20
Metra Median Station (235)			410				302				8

Source: Metra.

Table 5-10 shows mode share riders use to access Metra morning trains in Lake County. Table 5-11 provides the mode share riders use when alighting Metra morning trains in Lake County to reach their final destination. These data were obtained from Metra's spring 2019 Origin-Destination Survey.

Table 5-10. Lake County Metra Station Mode of Access (2019)

Station	Line	AM Ons	Percent of AM Boardings by Access Mode (2019)							
			Walk	Bike	Drove Alone	Carpool	Dropped Off	Bus	Taxi, Rideshare	Other
Winthrop Hrbr	UP-N	55	7%		56%	9%	28%			
Zion	UP-N	99	14%		56%	6%	19%		5%	
Waukegan	UP-N	479	9%		41%	10%	26%	8%	4%	1%
North Chicago	UP-N	77	39%		31%		19%	6%	6%	
Great Lakes	UP-N	88	13%		36%	6%	36%	8%		
Lake Bluff	UP-N	271	25%	5%	43%	6%	21%	1%		
Lake Forest	UP-N	397	24%	3%	48%	6%	19%	1%		1%
Fort Sheridan	UP-N	204	22%		46%	4%	24%	1%	2%	
Highwood	UP-N	164	54%	4%	14%		22%	5%		1%
Highland Park	UP-N	690	27%	3%	54%	3%	11%	1%		
Ravinia	UP-N	288	59%	1%	31%		8%	1%		
Braeside	UP-N	215	35%	1%	48%	3%	12%		1%	
Fox Lake	MD-N	276	5%		70%	6%	15%		2%	
Ingleside	MD-N	55	18%		64%	3%	15%			
Long Lake	MD-N	83	10%		65%	6%	17%	2%		
Round Lake	MD-N	332	5%		62%	4%	27%		1%	
Grayslake	MD-N	415	10%		68%	4%	18%			
Pra Crossing	MD-N	330	3%		73%	6%	17%		1%	
Libertyville	MD-N	626	11%		61%	3%	22%	1%	1%	
Lake Forest	MD-N	416	8%		66%	6%	15%	2%	3%	
Deerfield	MD-N	788	13%	1%	66%	4%	12%	1%	1%	1%
Lake Cook Rd	MD-N	469	8%		75%	5%	7%	3%	2%	
Antioch	NCS	174	7%		69%	4%	21%	1%		1%
Lake Villa	NCS	122	5%		71%		23%	1%		
Rnd Lake Beach	NCS	100	3%		61%	4%	26%	1%	4%	
Washington St.	NCS	73	2%	2%	59%	4%	30%	4%		
Pra Crossing	NCS	78	4%		73%		22%			
Mundelein	NCS	249	4%	1%	65%	3%	26%		1%	
Vernon Hills	NCS	383	14%	1%	63%	4%	16%	1%	1%	
Prairie View	NCS	397	29%		51%	6%	14%			
Buffalo Grove	NCS	623	8%	1%	71%	2%	18%		1%	
Barrington	UPNW	1,502	12%	1%	68%	3%	15%			

Source: Metra.

Table 5-11. Lake County Metra Station Mode of Egress (2019)

Station	Line	AM Offs	Percent of AM Alightings by Egress Mode (2019)							
			Walk	Bike	Drove Alone	Carpool	Pick up	Bus	Taxi, Rideshare	Other
Winthrop Hrbr	UP-N					no	data			
Zion	UP-N	9	20%					80%		
Waukegan	UP-N	164	29%	4%	3%	2%	17%	26%	15%	2%
North Chicago	UP-N	89	40%				8%	46%	6%	
Great Lakes	UP-N	130	37%	2%	3%		2%	57%		
Lake Bluff	UP-N	333	6%	1%	1%	1%	2%	88%	1%	1%
Lake Forest	UP-N	302	28%	1%		6%	2%	58%	6%	
Fort Sheridan	UP-N	40	36%	18%	9%		27%	9%		
Highwood	UP-N	40	74%					11%	16%	
Highland Park	UP-N	248	69%	2%	4%	4%	3%	17%	3%	
Ravinia	UP-N	15	75%						13%	13%
Braeside	UP-N	158	18%	1%	4%	13%	1%	58%	4%	
Fox Lake	MD-N	10	22%		11%			22%	22%	
Ingleside	MD-N					no	data			
Long Lake	MD-N	2					100%			
Round Lake	MD-N	19	43%		14%		14%	14%		14%
Grayslake	MD-N	23		20%	40%	20%		20%		
Pra Crossing	MD-N	33	20%		10%		10%	60%		
Libertyville	MD-N	82	26%		13%	5%	26%	16%	14%	
Lake Forest	MD-N	207	7%	1%	4%	1%	9%	68%	11%	
Deerfield	MD-N	208	23%	3%	2%	2%	8%	46%	14%	1%
Lake Cook Rd	MD-N	573	21%	1%	3%		2%	65%	7%	
Antioch	NCS	4	33%			17%		34%	17%	
Lake Villa	NCS	4	25%		50%		13%	13%		
Rnd Lake Beach	NCS	1	75%					25%		
Washington St.	NCS	5				50%	50%			
Pra Crossing	NCS	22						100%		
Mundelein	NCS	26	29%	7%	7%		21%	29%	7%	
Vernon Hills	NCS	16	19%		13%		13%	25%	25%	6%
Prairie View	NCS	20	83%			17%				
Buffalo Grove	NCS	64	54%		3%		11%	29%	3%	
Barrington	UP-NW	133	46%		13%	5%	12%	22%	1%	

Source: Metra.

As shown on Table 5-10 the single most common way Metra riders access a station is to drive and park. For this reason, the availability of parking is an important factor to encouraging use of Metra services. Table 5-12 presents parking utilization data at Lake County Metra stations, including capacity as measured by the number of parking spaces. Parking use is based on sampled observed vehicles counts made by Metra staff. Where parking is sold on a permit basis, occupancy is adjusted for permitted spaces that are sold but not used, that is, Effective Occupancy. Overall Effective Occupancy averaged 57 percent, and the following four stations reported the highest effective use rates.

- Braeside UP-N (85%)
- Deerfield MD-N (95%)
- Long Lake MD-N (89%)
- Prairie View NCS (95%)

Most Lake County Metra stations charge for parking, ranging from \$1.50 to \$5.00 per day. No fee is charged commuters at the UP-N Zion Station, based on available information.

Table 5-12. Lake County Metra Station Parking Capacity and Use (2019)

Station	Mile Post	Line	Total Capacity	Observed Use	Effective Use	Observed Occupancy	Effective Occupancy
Winthrop Hrbr	44.5	UP-N	107	36	36	34%	34%
Zion	42.1	UP-N	98	45	45	46%	46%
Waukegan	35.9	UP-N	439	200	200	46%	46%
No. Chicago	33.7	UP-N	50	12	12	24%	24%
Great Lakes	32.0	UP-N	146	51	51	35%	35%
Lake Bluff	30.2	UP-N	204	128	129	63%	63%
Lake Forest	28.3	UP-N	788	625	654	79%	83%
Fort Sheridan	25.7	UP-N	356	123	137	35%	38%
Highwood	24.5	UP-N	123	63	63	51%	51%
Highland Park	23.0	UP-N	533	348	360	65%	68%
Ravinia	21.5	UP-N	171	114	140	67%	82%
Braeside	20.5	UP-N	141	120	120	85%	85%
Fox Lake	49.5	MD-N	440	276	305	63%	69%
Ingleside	47.8	MD-N	119	39	39	33%	33%
Long Lake	46.0	MD-N	47	42	42	89%	89%
Round Lake	44.0	MD-N	484	191	215	39%	44%
Grayslake	41.0	MD-N	666	262	262	39%	39%
Pra Crssing	39.2	MD-N	384	285	288	74%	75%
Libertyville	35.5	MD-N	514	374	428	73%	83%
Lake Forest	28.4	MD-N	517	295	384	57%	74%
Deerfield	24.2	MD-N	616	566	586	92%	95%
Lake Cook Rd	23.0	MD-N	655	440	440	67%	67%
Antioch	52.8	NCS	316	113	113	36%	36%
Lake Villa	48.2	NCS	228	72	72	32%	32%
Rnd Lake Bch	45.9	NCS	366	50	50	14%	14%
Washingtn St.	43.9	NCS	149	30	30	20%	20%
Pra Crssing	40.7	NCS	252	53	53	21%	21%
Mundelein	36.9	NCS	364	163	163	45%	45%
Vernon Hills	33.0	NCS	646	226	226	35%	35%
Prairie View	31.6	NCS	340	265	323	78%	95%
Buffalo Grove	29.5	NCS	1,050	369	369	35%	35%
Barrington	31.9	UP-NW	914	539	613	59%	67%
TOTAL			12,223	6,515	6,948	53%	57%

Source: Metra.

5.2.2 Metra Improvement Projects and Initiatives

5.2.2.1 Metra Near-Term Improvement Projects

Metra's 2020 Capital Program includes the following projects in Lake County.

- **UP-N Waukegan Station:** Rehabilitation of the Waukegan Station includes extending the west platform, adding on-demand heated shelters on the east platform, and renovation of the restrooms.
- **MD-N Rondout Track:** Track renewal and reconfiguration of the Rondout Interlocking.
- **MD-N Bridge A318:** Engineering design services for a new second-track siding over the North Branch of the Chicago River at milepost 32.4 in Rondout, allowing for additional train movements through the Fox Lake subdivision.
- **MD Grade Crossings:** Provides for the renewal of rail highway grade crossings at various locations on the MD-N and -W Lines. This is a 50/50 project in partnership with Canadian Pacific Railway .
- **MD-N Lake Forest Crossovers:** Construction of replacement of crossovers in Lake Forest.

- **NCS Improvements:** Installation of rail, ties and ballast, undercutting, and other capital improvements on the NCS Line.

5.2.2.2 Metra Long Range Plan Initiatives

Metra recognizes that the region's travel markets continue to evolve and change, and there is a need to position itself to best respond to those changes. One of the greatest needs for the legacy commuter rail system that Metra inherited is the maintenance of existing capital assets. However, Metra also seeks to look to the future with a balanced approach to capital investment. As sufficient capital funding from state, federal, or other sources is provided, Metra has identified improvements and expansions for future investment. The following is a list of improvements and expansions located in Lake County that were evaluated by Metra in 2018.

- **UP-N Improvements:** Possible improvements included:
 - Infrastructure: Add third track south of Glencoe, power-up Highland Park Crossover, new relocated Waukegan Coach Yard, add parking, new rolling stock.
 - Service: Reconfigure peak schedules into two zones, add reverse commute trains, upgrade off-peak to 30-minute frequencies.
- **MD-N Improvements:** Possible improvements included:
 - Infrastructure: Add third track Rondout to Junction A-5, extend track sidings on the Fox Lake Branch, new auxiliary coach yard at Rondout, expand commuter parking, new rolling stock.
 - Service: Add express peak and reverse trains, 30-minute off-peak service.
- **NCS Improvements:** Possible improvements included:
 - Infrastructure: Add second track through Deval Interlocking, add siding north of Mundelein Station, expand Antioch Coach Yard, new rolling stock.
 - Service: Add peak express trains, fill gaps in off-peak service, and expand reverse commute service.
- **MD-N Extension to Richmond:** Extend MD-N service beyond Fox Lake seven miles to Richmond and Spring Grove in McHenry County.
- **MD-N Branch to Wadsworth:** At the Rondout Junction, extend MD-N commuter service on the CP freight line to Wadsworth.
- **STAR Line North:** Add a 26-mile commuter rail route using the CN freight line between Hoffman Estates and Waukegan.
- **NCS Analysis and Implementation Study:** This study to plan for locally funded improvements to the NCS was completed; the project's Steering Committee will continue to meet to decide next steps.

5.2.3 Metra Station Area Development

A longer-term strategy to increase Metra use would be to encourage the development of the station area in such a way as to maximize the number of potential users who are within walking distance of stations. This type of change to the built environment is typically called Transit-Oriented Development (TOD). TOD principles include higher density, mixed-use development, and making improvements to street infrastructure (e.g., sidewalks, lighting, landscaping) to encourage a walkable environment.

Table 5-13 shows 2017 estimated population, households, and jobs in the half-mile station area of each of the Lake County stations. Stations that have 85 percent or higher of the Metra systemwide median in terms of the selected socio-economic variables (population, households, jobs) are highlighted in gray. These stations can be considered to have a level of density that is supportive of transit usage in the Chicago commuter rail context. Those that are below this threshold may be able to support further infill or redevelopment in such a way as to better encourage transit travel in the future.

As can be seen, most Lake County Metra stations have less residential development than the identified threshold, while more than half of the stations report employment levels above the threshold. Only four

stations meet both population and employment thresholds—and thus presumably have the diverse live-work environment that makes the station a convenient transit trip generator and attractor. This suggests that there are a number of opportunities to encourage a certain type of development pattern near specific stations to improve the land use-transportation balance for more sustainable future growth.

Many communities hosting Metra stations in Lake County have prepared TOD plans that were funded by RTA's community planning program. It is believed that many other communities have self-funded TOD plans, or incorporated station area plans as part of comprehensive planning programs.

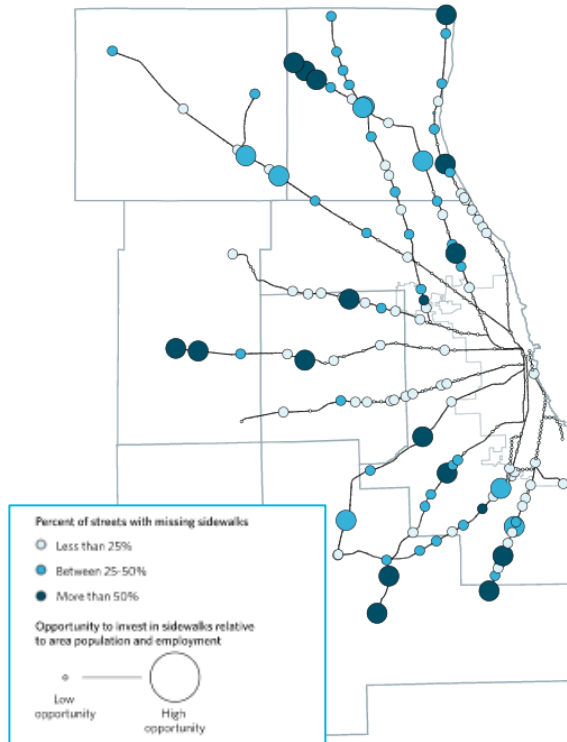
Table 5-13. Metra Station Socio-Economics (half-mile radius)

Station	LINE	Weekday Boardings*	2017 Socio-Economic Data**			RTA-Funded TOD Study
			Population	Households	Jobs	
Winthrop Hrbr	UP-N	56	982	391	327	2005
Zion	UP-N	99	1,441	475	2,600	
Waukegan	UP-N	500	2,674	894	4,349	
No. Chicago	UP-N	122	3,469	710	4,235	
Great Lakes	UP-N	173	4,894	59	705	
Lake Bluff	UP-N	539	2,933	1,114	1,118	2014
Lake Forest	UP-N	569	1,620	679	4,902	
Fort Sheridan	UP-N	229	2,586	871	550	
Highwood	UP-N	176	5,560	1,847	1,690	
Highland Park	UP-N	836	3,652	1,702	6,566	
Ravinia	UP-N	275	2,839	1,090	741	2013
Braeside	UP-N	357	1,487	562	802	
Fox Lake	MD-N	280	1,756	867	1,980	
Ingleside	MD-N	57	1,246	482	328	
Long Lake	MD-N	81	1,692	619	193	
Round Lake	MD-N	347	2,291	632	1,547	2017
Grayslake	MD-N	408	2,396	939	214	
Pra Crssing	MD-N	295	481	158	410	
Libertyville	MD-N	652	2,564	1,206	3,018	
Lake Forest	MD-N	509	889	322	989	
Deerfield	MD-N	991	3,744	1,559	2,855	2011
Lake Cook Rd	MD-N	812	486	161	5,103	
Antioch	NCS	164	2,244	950	2,486	
Lake Villa	NCS	109	1,025	476	1,804	
Rnd Lake Bch	NCS	103	1,835	529	1,688	2013
Washingtn St.	NCS	73	2,423	816	217	
Pra Crssing	NCS	84	262	86	142	
Mundelein	NCS	244	3,757	1,240	2,195	
Vernon Hills	NCS	369	2,037	605	353	
Prairie View	NCS	388	2,571	984	913	2007
Buffalo Grove	NCS	629	2,061	846	1,776	
Barrington	UP-NW	1,487	2,948	1,186	4,025	
Metra Station Median		410	4,287	1,587	1,719	
						>85% of median

*Metra 2018 counts.

**ArcGIS Online using Enrich Layer tool.

Figure 5-9: Sidewalk Coverage and Opportunity



In addition to these measures of population and employment density near the stations, it is also valuable to consider the quality of the street infrastructure near the stations. CMAP analysis on the sidewalk inventory has shown that 14 percent of Metra stations systemwide have excellent sidewalk coverage (at least 99 percent of roads in the half mile station area) and 7% have poor coverage (less than 50 percent of station area roads have sidewalks). As is visible in Figure 5-9, Lake County has five stations where over half of streets are missing sidewalks and there is a high opportunity to invest, and three stations with 25 percent to 50 percent missing sidewalks and a high opportunity to invest.

Source: CMAP analysis of 2018 Regional Sidewalk Inventory, 2015 population estimates from the Parcel-Based Housing Inventory, and 2015 Dun and Bradstreet data.

5.3 PACE

Pace Suburban Bus provides bus-based service in the suburban areas of the six-county Chicago region (same as CMAP region with the exception of Kendall County). Pace offers a family of public transportation services, ranging from fixed-route bus, demand-response service, suburban ADA paratransit service, and City ADA paratransit service. Pace also has one of the largest vanpool programs in the nation and became the regional ridesharing administrator for Northeastern Illinois in 2006.

5.3.1 Fixed-Route Service

Pace operates a fixed-route bus service network of approximately 200 routes that use set schedules and routings. In 2019 34 Pace routes operated in Lake County across the following service types:

- 1) **CTA Connector:** Provides connections to CTA rapid transit stations;
- 2) **Suburban Links:** Connects suburban communities;
- 3) **Intra-community:** Provides local service within a community;
- 4) **Commuter Links:** Connects to specific employment areas;
- 5) **On Demand (formerly known as Call-n-Ride):** General public, reservation-based service for travel within a designated service area; and
- 6) **Seasonal:** Service to major attractions.

Table 5-14 lists the 34 Lake County Pace routes grouped by the six service types. Information is also provided on the applicable fare category and whether the routes extend to another county (fifteen of the routes also operate in Cook County and one in McHenry). Based on the service in effect according to the schedule date shown, the frequency of bus service by service day (i.e., weekday, Saturday, and Sunday) is provided. Fourteen routes offer Saturday service in addition to weekday, while Sunday service is offered on only three routes. Most of the weekend routes serve Waukegan. Commuter Links routes offer peak period service only, and have the service mark of *Shuttle Bug*.

Table 5-14. Lake County Pace Routes by Service Type

	#	Route	Fare Group	Other County Served	Schedule Effective Date	Service Frequencies		
						Weekday	Saturday	Sunday
CTA Connector	213	Green Bay Road	Regular	Cook	01-Jul-19	Peak: 15 mins Off-peak: 30 mins	30 mins	
	422	Linden CTA/ Glenview/ Northbrook Court	Regular	Cook	12-Aug-19	30 mins		
	626	Skokie Valley Limited	Regular	Cook	09-Apr-18	Peak: 30 mins		
Suburban Links	234	Wheeling-Des Plaines	Regular	Cook	20-May-19	Peak: 20-40 mins Off-peak: 60 mins		
	272	Milwaukee Ave North	Regular	Cook	12-Aug-18	Peak: 20-40 mins Off-peak: 60 mins	60 mins	
	471	Highland Park- Northbrook Court	Regular	Cook	18-Sep-17	Peak: 30 mins Off-peak: 60 mins	60 mins	
	472	Highland Park- Highwood	Regular		20-May-19	Peak: 20-30 mins Off-peak: 60 mins	60 mins	
	572	Washington St.	Local/Feeder		12-Aug-19	30 mins	60 mins	
	806	Crystal Lake-Fox Lake	Regular	McHenry	18-Sep-17	Peak: 30-90 mins		
Intra-community	561	Castlecrest via McAree	Local/Feeder		08-Apr-19	Peak: 30 mins Off-peak: 60 mins	60 mins	
	562	Gurnee via Sunset	Local/Feeder		09-Dec-19	Peak: 15-30 mins Off-peak: 60 mins		
	563	Great Lakes Naval Station	Local/Feeder		10-Jun-19	60 mins		
	564	Jackson/ 14th Street	Local/Feeder		18-Sep-17	60 mins	60 mins	
	565	Grand Avenue	Local/Feeder		19-May-19	30 mins	30 mins	60 mins
	566	McAree/ Keller	Local/Feeder		12-Aug-19	Peak: 15-40 mins		
	568	Belvidere	Local/Feeder		11-Aug-19	30 mins	60 mins	60-80 mins
	569	Lewis	Local/Feeder		12-Aug-19	Peak: 15 mins Off-peak: 60 mins		
	570	Fox Lake/ College of Lake County	Local/Feeder		21-Jan-19	60 mins	60 mins	
	571	Zion	Local/Feeder		17-Sep-17	30 mins	60 mins	60-80 mins
	573	Green Bay Road	Local/Feeder		12-Aug-19	Peak: 60 mins		
Commuter Links	574	College of Lake Co/ Hawthorn Mall	Regular		12-Aug-19	60 mins	60 mins	
	627	Discover-Takeda Shuttle Bug 7	Regular	Cook	02-Jan-20	4 am, 3 pm peak trips		
	628	Braeside Shuttle Bug 8	Regular	Cook	02-Jan-20	3 am, 3 pm peak trips		
	629	Braeside Shuttle Bug 9	Regular	Cook	02-Jan-20	3 am, 3 pm peak trips		
	631	Lake Cook Shuttle Bug 1	Regular	Cook	02-Jan-20	4 am, 4 pm peak trips		
	632	Lake Cook Shuttle Bug 2	Regular	Cook	28-Oct-19	4 am, 4 pm peak trips		
	633	Lake Cook Shuttle Bug 3	Regular	Cook	28-Oct-19	5 am, 4 pm peak trips		
	634	Lake Cook Shuttle Bug 4	Regular	Cook	02-Jan-20	2 am, 3 pm peak trips		
	635	Lake Cook Shuttle Bug 5	Regular	Cook	28-Oct-19	5 am, 5 pm peak trips		
On Demand	640	Braeside-Commercial Ave Shuttle Bug	Regular	Cook	06-Aug-18	2 am, 3 pm peak trips		
	590	Round Lake Area	Regular			On Demand: 6:00am-6:15pm		
Seasonal	593	Vernon Hills-Mundelein	Regular			On Demand: 6:00am-6:15pm		
	284	Schaumburg-Great America Gurnee Express	Premium (\$4)	Cook		Friday only TO: 9:30am departure FROM 15 mins after close	TO: 9:30am departure FROM 15 mins after close	
	475	Ravinia Festival Express	Free			Buses depart one hour before the start of events and make continuous trips to the Ravinia Fest entrance; return service from Ravinia provided at the end of events.		

Table 5-15 provides an overview of Pace fixed-route services within Lake County.

Table 5-15. Pace Fixed-Route Services

Route	Area Served	Service & Markets
213	Corridor between Howard CTA and Highland Park Metra	All day and Saturday service to area generally along Green Bay Road, serving business districts, high schools, the Chicago Botanical Gardens, and Northbrook Court.
234	Des Plaines, Wheeling, Buffalo Grove	All-day service Monday-Friday. Selected peak period trips extend along Milwaukee Avenue to Buffalo Grove in Lake County.
272	Corridor between Niles and Vernon Hills	Full service six days per week, generally along Milwaukee Avenue. Connects to Pace Pulse Milwaukee Line at Golf Mill.
422	Area between Wilmette, Linden CTA and Northbrook	This all-day Monday-Friday service mostly operates in Cook County, with its northern terminal at the Lake-Cook County line at Northbrook Court.
626	Between CTA Yellow Line and Lincolnshire	Provides weekday peak service from the CTA Skokie Swift to the Lincolnshire Corporate Center, serving job along Lake Cook Road and Milwaukee Avenue. Buses use the Bus-on-Shoulder lanes on the Edens Expressway.
471	Highland Park, Deerfield and Northbrook	Full service six days per week. Connects with Metra service on UP-N and MD-N, shopping districts, and employment centers.
472	Highland Park	Full service six days per week. Operates a general north-south orientation in the City of Highland Park.
561	Beach Park, Waukegan	Provides weekday and Saturday service between downtown Waukegan and the northwest side of the City.
562	Gurnee, Waukegan	Provides weekday service between downtown Waukegan and areas west to Gurnee.
563	Great Lakes Naval Training Center, North Chicago, Waukegan	Provides weekday service between downtown Waukegan and area south of the City, including the Naval Training Center and North Chicago.
564	North Chicago, Waukegan	Provides weekday and Saturday service between downtown and Fountain Square in Waukegan, general south and west.
565	Gurnee, Waukegan	Provides daily service from the Waukegan Metra Station near Sheridan Road to the College of Lake County in Grayslake. Serves the commercial area along Grand Avenue including Six Flags Great America, downtown Waukegan, and the areas surrounding Gurnee Mills.
566	Beach Park, Waukegan	Provides weekday rush hour service to Waukegan High School Brookside Campus operating between Woodland Village, Belvidere Park and McAre/Yorkhouse.
568	Park City, Waukegan	Provides daily service between Washington/Sheridan and Fountain Square in Waukegan. The Lake County Health Department, Belvidere Mall, downtown Waukegan and Woodland Village are served.
569	Beach Park, Great Lakes Naval Training Center, North Chicago, Waukegan	Provides weekday service between the Lovell Federal Health Care Center and Lewis/Edgewood along the Lewis Avenue crosstown roadway in Waukegan.
570	Corridor between Fox Lake and Grayslake	Provides weekday and Saturday service between the College of Lake County and the Fox Lake Metra Station (weekdays) and between the College of Lake County and the Round Lake area (Saturdays).
571	Beach Park, Waukegan, Zion	Provides daily service between downtown Waukegan and Zion.
572	Central Lake County Waukegan-Grayslake	Full service six days per week. Service is generally along Washington Street, serving downtown Waukegan, College of Lake County, and Great America.
573	Beach Park, Gurnee, Waukegan	Provides weekday rush hour service along Green Bay Road between Woodland Village and Edgewood/Newcastle in Waukegan.
574	Grayslake, Libertyville, Mundelein, Vernon Hills	Provides weekday and Saturday service between College of Lake County and the Hawthorn Mall in Vernon Hills. Service is provided along Highways 45 and 21 in Libertyville, Mundelein and the Vernon Hills area.

Route	Area Served	Service & Markets
626	CTA Yellow Line to Lincolnshire	Provides weekday peak service from the CTA Yellow Line to the Lincolnshire Corporate Center, serving jobs along Lake Cook Road and Milwaukee Avenue. Buses use the Bus-on-Shoulder lanes on the Edens Expressway.
627	Lake Cook Employment Area	Weekday rush hour Shuttle Bug #7 service between the Metra MD-N Lake Cook Road Station, Discover Financial Services and Lake Cook Rd/Takeda Pkwy - Pointe Drive.
628	Lake Cook Employment Area	Weekday rush hour Shuttle Bug #8 service between the Metra UP-N Braeside Station, Discover Financial Services, Baxter, Wolters Kluwer, Four Parkway North and One Parkway North.
629	Lake Cook Employment Area	Weekday rush hour Shuttle Bug #9 service between the Metra UP-N Braeside Station, Walgreens (Wilmot Road and Lake Cook Road Campuses) and Oracle.
631	Lake Cook Employment Area	Weekday rush hour Shuttle Bug #1 service between the Metra MD-N Lake Cook Road Station, Discover Financial Services and Wolters Kluwer.
632	Lake Cook Employment Area	Weekday morning rush hour Shuttle Bug #2 service between the Metra MD-N Lake Cook Road Station and Baxter, Four Parkway North and One Parkway North; weekday evening rush hour service is to the MD-N Deerfield Station.
633	Lake Cook Employment Area	Weekday rush hour Shuttle Bug #3 service between the Metra MD-N Lake Cook Road Station and Walgreens (Wilmot Road Campus).
634	Lake Cook Employment Area	Weekday rush hour Shuttle Bug #4 service between the Metra MD-N Lake Cook Road Station, Walgreens (Lake Cook Road Campus), Riverwalk and Corptax Inc.
635	Lake Cook Employment Area	Weekday rush hour Shuttle Bug #5 service between the Metra MD-N Lake Cook Road Station, Underwriters Laboratories, the Commercial Avenue Corridor and Walgreens (Commercial Avenue Campus). This route is mainly in Cook County.
640	Lake Cook Employment Area	Weekday rush hour Shuttle Bug service between the Metra UP-N Braeside Station, the Commercial Avenue Corridor, Walgreens (Commercial Avenue and Wilmot Road Campuses) and Baxter.
806	Corridor between Fox Lake and Crystal Lake	Peak-only service Monday-Friday. Service is mostly in McHenry with the eastern terminal at the Fox Lake Town Center.
Route	Areas Served	On Demand Service
590	Round Lake Area On Demand	Provides weekday On Demand service to communities in the Round Lake area bounded by Monaville Rd, Cedar Lake Rd., Railroad Ave., Main St., Belvidere Rd., US 45, Washington St. and IL 83. Scheduled stops occur at the College of Lake County. Reservations can be made online or by phone between 6:00am and 6:15pm.
593	Vernon Hills-Mundelein On Demand	Provides weekday On Demand service to neighborhoods in Vernon Hills and Mundelein bounded by Milwaukee Ave., Route 45/83, N. Midlothian Rd., E. Hawley St., and the Metra NCS Line. Scheduled stops occur at Hawthorn Mall. Reservations can be made online or by phone between 6:00am and 6:15pm.
Route	Areas Served	Seasonal Service
284	Seasonal Service to Six Flags Great America	This express route operates between the Northwest Transportation Center in Schaumburg and the Rosemont CTA Terminal to Great America. Service operates Fridays, Saturdays, and Sundays when the park is open (generally June-September).
475	Ravinia Express: Ravinia Festival Park-n-Ride Shuttle, Highland Park	Pace Park-n-Ride lots are located along St. Johns Avenue at Elm Place, and at the Ravinia and Braeside Metra Stations. Buses depart one hour before the start time of each event and make continuous non-stop trips between the park-n-ride locations to the Ravinia Fest entrance along St. John's Avenue. For the return, service from Ravinia Fest to the Park-n-Ride locations is provided at the conclusion of each event.

Source: Pace Bus.

Figure 5-10 provides a map of Pace fixed-route services in Lake County.

Figure 5-10. Pace Fixed Route Services

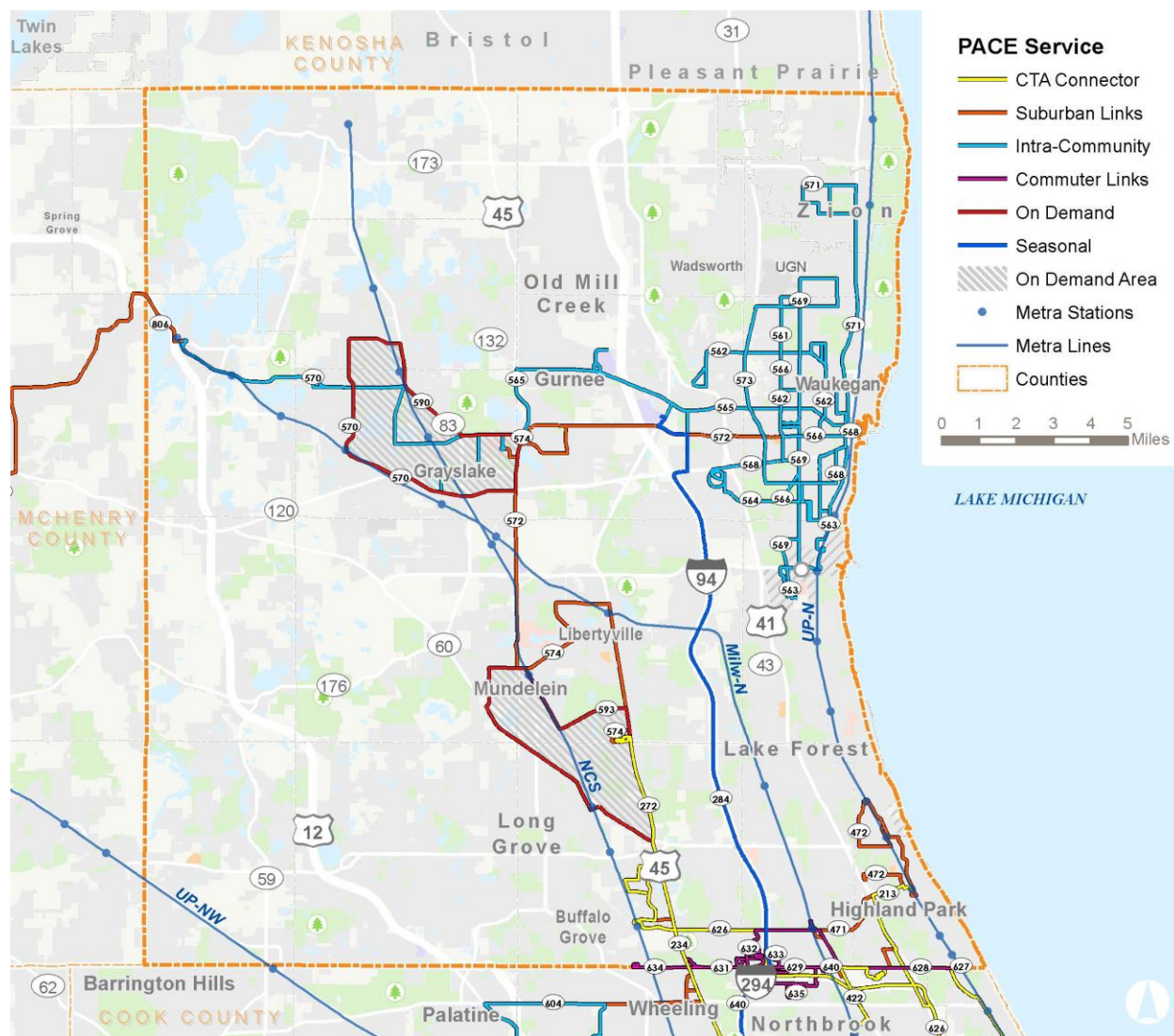


Table 5-16 provides average daily ridership for each of the Lake County Pace routes for the third quarter (i.e., July-September in 2018 and 2019) to assess recent year-over-year trends. The top five routes by weekday ridership remained the same in both years, and are highlighted in gray.

Table 5-16. Pace Average Daily Ridership by Route

	#	Route	Jul-Sep Average Weekday Riders		Jul-Sep Average Saturday Riders		Jul-Sep Average Sunday Riders	
			2018	2019	2018	2019	2018	2019
CTA Connector	213	Green Bay Road	974	1,266	515	687	-	-
	422	Linden CTA/ Glenview/ Northbrook Court	530	502	-	-	-	-
	626	Skokie Valley Limited	383	319	-	-	-	-
Suburban Links	234	Wheeling-Des Plaines	251	225	-	-	-	-
	272	Milwaukee Ave North	609	601	329	307	-	-
	471	Highland Park-Northbrook Crt	132	130	60	55	-	-
	472	Highland Park- Highwood	86	90	42	61	-	-
	572	Washington St.	640	560	188	145	-	-
	806	Crystal Lake-Fox Lake	27	20	-	-	-	-
Intra-community	561	Castlecrest via McAree	235	234	116	114	-	-
	562	Gurnee via Sunset	269	251	-	-	-	-
	563	Great Lakes Naval Station	156	158	-	-	-	-
	564	Jackson/ 14th Street	182	156	134	117	-	-
	565	Grand Avenue	1,070	1,042	799	780	358	381
	566	McAree/ Keller	145	128	-	-	-	-
	568	Belvidere	736	716	366	322	271	242
	569	Lewis	432	467	-	-	-	-
	570	Fox Lake/ College of Lake County	213	192	67	53	-	-
	571	Zion	547	573	301	285	184	174
	573	Green Bay Road	11	9	-	-	-	-
	574	C LC/ Hawthorn Mall	276	233	109	102	-	-
Commuter Links	627	Discvr-Takeda Shuttle Bug 7	148	146	-	-	-	-
	628	Braeside Shuttle Bug 8	63	53	-	-	-	-
	629	Braeside Shuttle Bug 9	34	27	-	-	-	-
	631	Lake Cook Shuttle Bug 1	116	101	-	-	-	-
	632	Lake Cook Shuttle Bug 2	95	90	-	-	-	-
	633	Lake Cook Shuttle Bug 3	129	113	-	-	-	-
	634	Lake Cook Shuttle Bug 4	33	27	-	-	-	-
	635	Lake Cook Shuttle Bug 5	94	83	-	-	-	-
	640	Braeside-Commercial Ave Shuttle Bug	42	47	-	-	-	-
On Demand	590	Round Lake Area	30	32	-	-	-	-
	593	Vernon Hills-Mundelein	38	36	-	-	-	-
Sea-sonal	284	Schaumburg-Great America Gurnee Express*	101	61	72	65	65	44
	475	Ravinia Festival Express*	3,864	3,931	2,926	5,192	4,436	4,185

*Average of routes respective season in 2018 and 2019

Source: Pace

Table 5-17 summarizes average daily ridership by service day and service group.

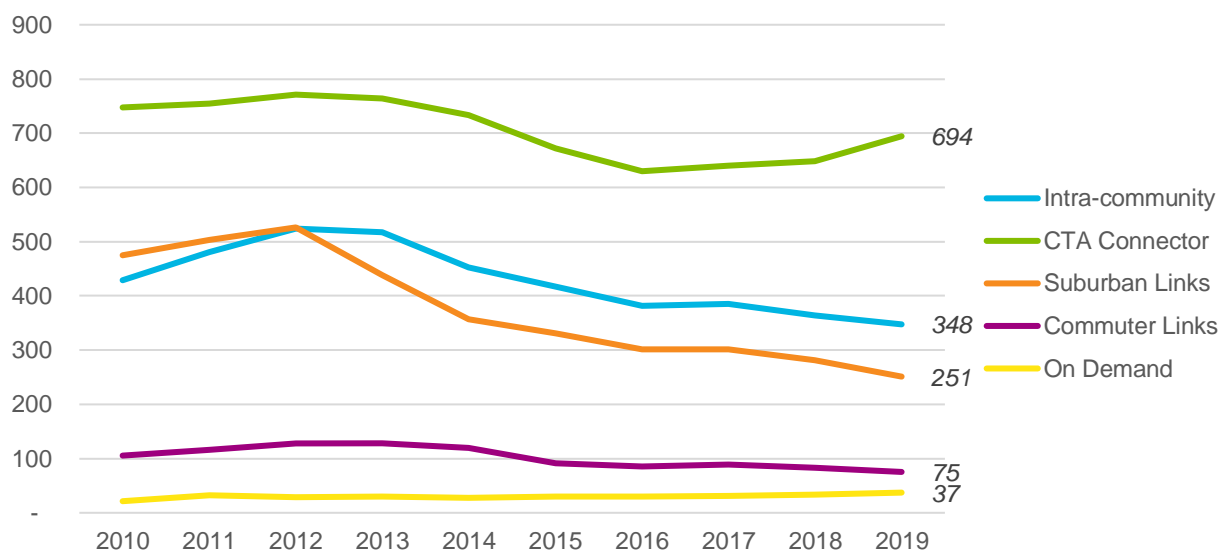
Table 5-17. Pace Average Daily Ridership by Service Day and Group

				Average Daily Riders, Jul-Sep					
	Number of Routes			Weekday		Saturday		Sunday	
	Wkdy	Sat	Sun	2018	2019	2018	2019	2018	2019
CTA Connector	3	1	0	1,887	2,087	515	687	0	0
Suburban Links	6	4	0	1,745	1,626	619	568	0	0
Intra-community	12	7	3	4,272	4,159	1,892	1,773	813	797
Commuter Links	9	0	0	754	687	0	0	0	0
On-Demand	2	0	0	68	68	0	0	0	0
Seasonal	2	2	2	3,965	3,992	2,998	5,257	4,501	4,229
Grand Total	34	14	5	12,691	12,619	6,024	8,285	5,314	5,026

Source: Pace

Long-term trends in average weekday ridership for Lake County bus routes by Pace service category is provided in Figure 5-11 (note: routes and months are equally weighted in this calculation). Generally, average ridership has been holding steady or declining across all categories except CTA Connector, which has been rising since 2016 due to strong performance by Route 213 Green Bay Road.

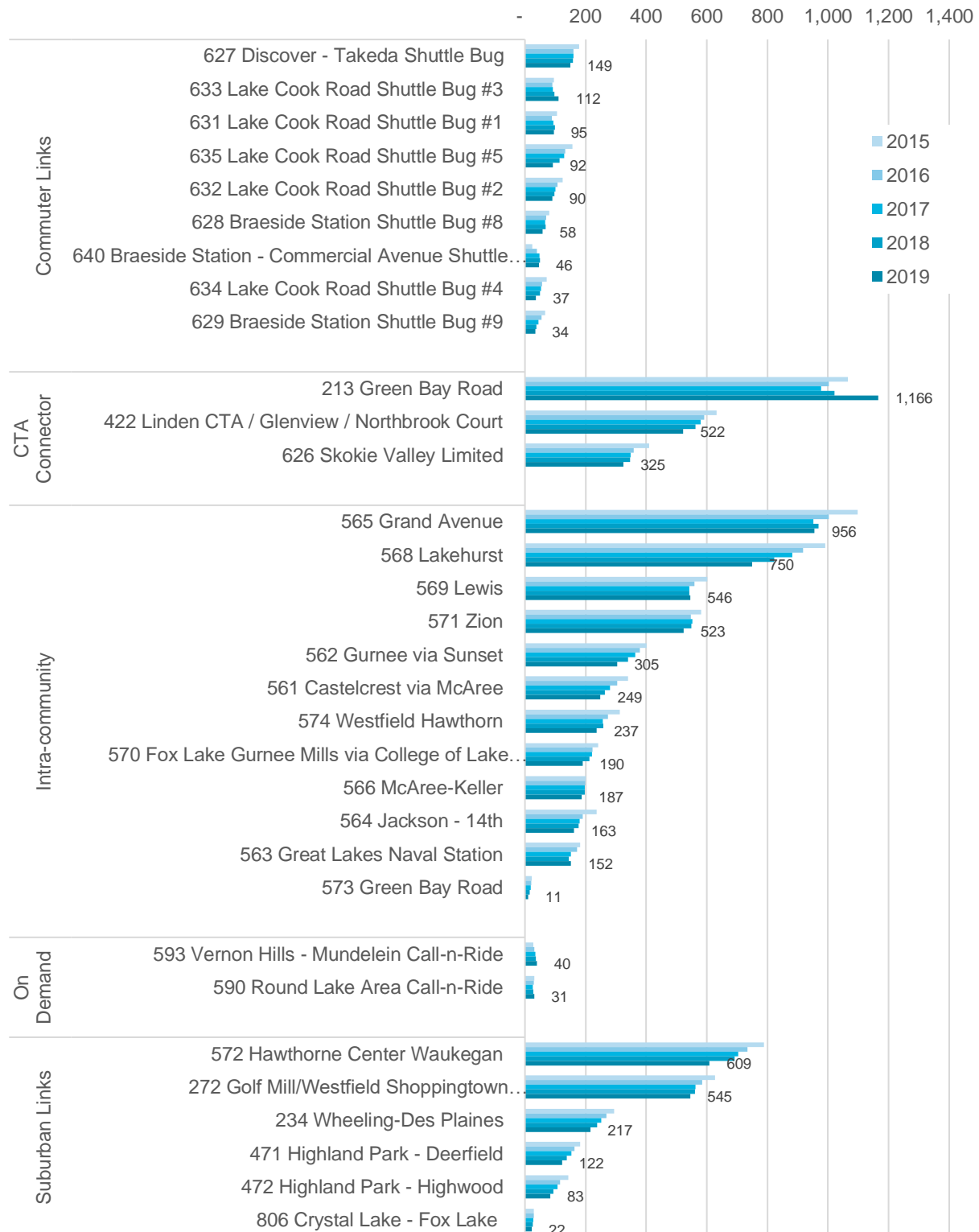
Figure 5-11: Lake County Pace Bus Average Weekday Ridership Trends by Service Category



Source: RTAMS Average Weekday Ridership by Month (2020).

To better compare ridership across different routes over the past five years, the two-year rolling average of weekday ridership is presented in Figure 5-12, sectioned by service group. The labeled figure is the average from 2018-2019. As this chart illustrates, bus ridership has falling for many of the routes, with the notable exception of 213 Green Bay Road.

Figure 5-12: Pace Average Weekday Ridership by Route (two-year rolling average)



Source: RTAMS Average Weekday Ridership by Month (2020).

Pace Ridership
2019 Average Daily Ridership

- < 50
- 51 - 150
- 151 - 350
- 351 - 700
- > 701

Metra Stations
Metra Lines
Counties

0 1 2 3 4 5 Miles

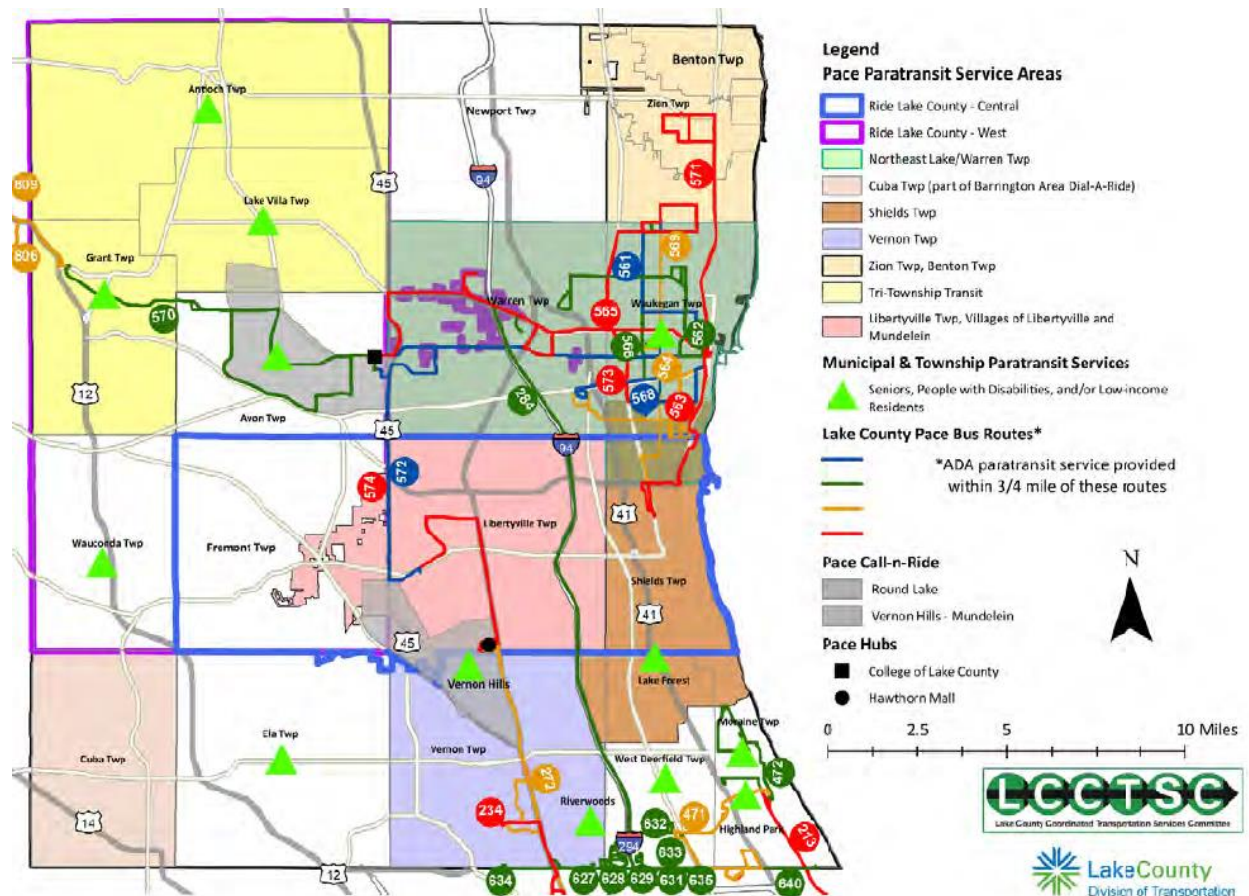
5.3.2 Paratransit Service

5.3.2.1 ADA Paratransit

Eligible individuals may make trips within a corridor that extends three-quarters of a mile around each fixed route during the days and hours that service on that route is in operation. In Lake County, ADA paratransit service generally begins at 5:30 or 6 a.m. and ends between 6 and 10 p.m. on weekdays;

begins between 7 a.m. and 9 a.m. and ends between 6 and 11 p.m. on Saturdays on a limited number of routes; and is offered between 10 a.m. and 8 p.m. on Sundays on three routes. Figure 5-14 provides an overview of Lake County's paratransit network, as described in the 2019 Paratransit Market Study. The map shows Pace services (fixed routes, On Demand, and Dial-A-Ride (Ride Lake County)), as well as paratransit services operated by townships and municipalities.

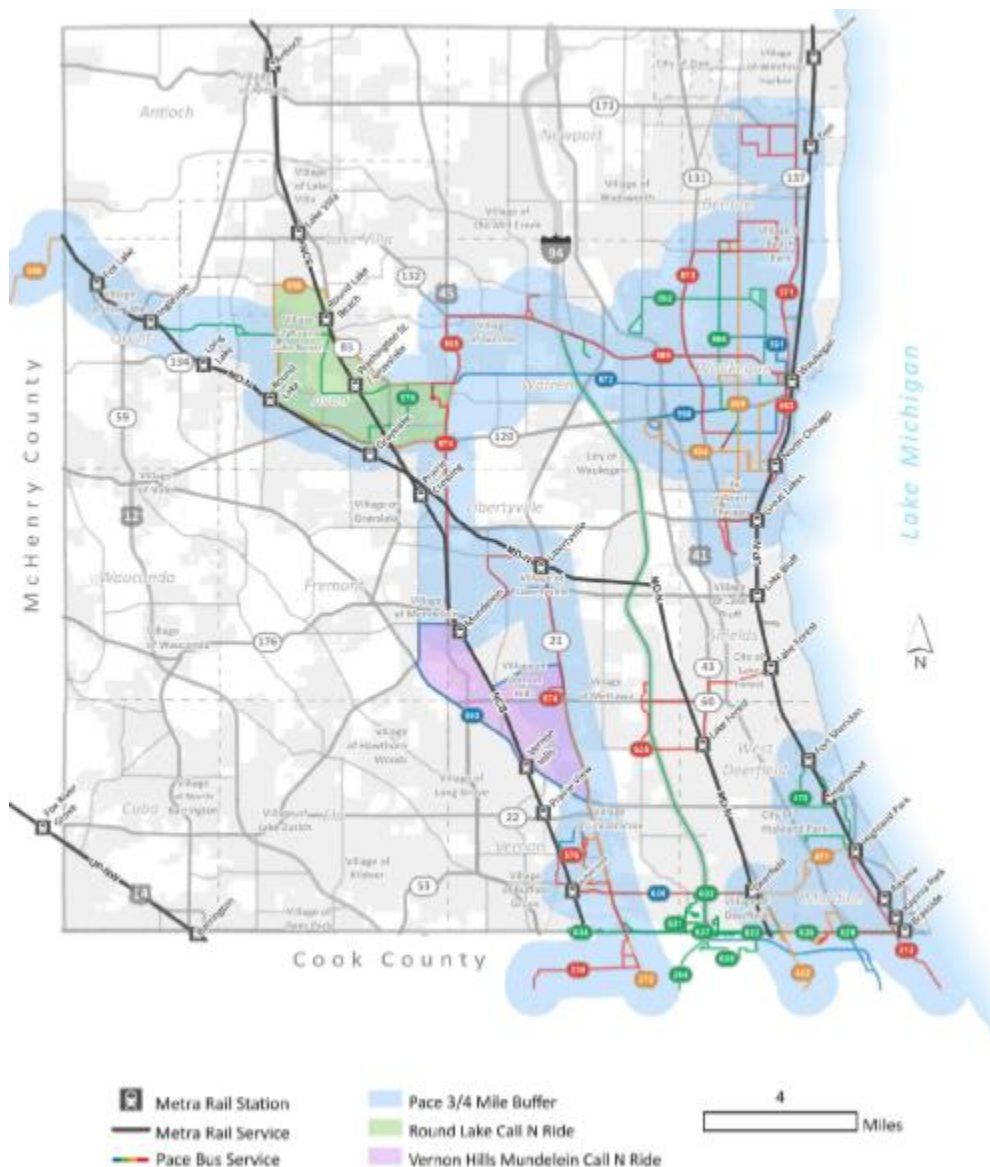
Figure 5-14. Paratransit Network



Source: Lake County Paratransit Market Study.

Figure 5-15 presents a map of the ADA paratransit services, including the On Demand (i.e., Call-n-Ride) services areas.

Figure 5-15. Lake County ADA Paratransit Services



Source: Lake County website: <http://www.lakecountyil.gov/3487/Pace-ADA-Paratransit-Services>.

5.3.2.2 RideLakeCounty

Pace curb-to-curb dial-a-ride service is provided to eligible residents of designated Lake County townships, and can be used for such trips as medical appointments, shopping, attending College of Lake County, and jobs. The programs are sponsored by the participating townships, Lake County Coordinated Transportation Services Committee (LCCTSC), Lake County, and Pace. The service is funded in part by grants from the RTA, with local matching funds for these federal grants provided by Lake County and Pace. There are two RideLakeCounty service areas, including Central and West. Maps of the two area are provided in Figure 5-16 and Figure 5-17.

Figure 5-16. RideLakeCounty – Central

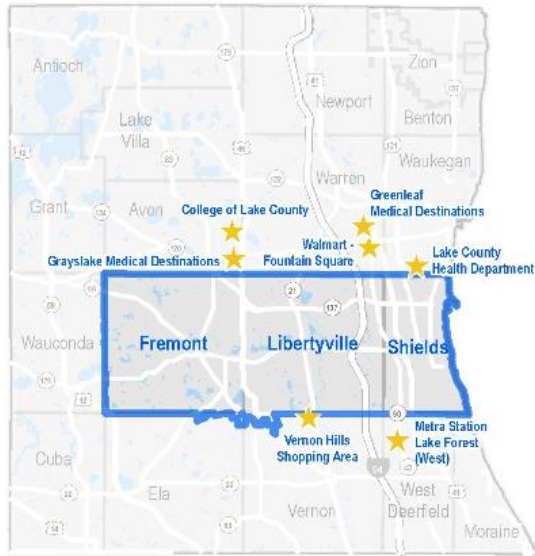
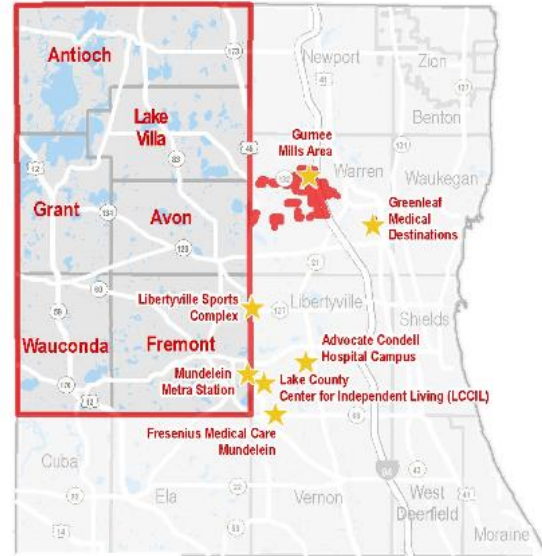


Figure 5-17. RideLakeCounty – West



Source: Lake County Website: <https://www.lakecountyil.gov/3486/RideLakeCounty>

5.3.2.3 Township and Community Programs

Table 5-18 list paratransit programs that are provided at the township and municipal levels. As can be seen, there is significant coordination in services between the various providers.

Table 5-18. Lake County Township and Community Paratransit Programs

Township or Municipality	Service
Antioch Township	RideLakeCounty/West, In-House Demand Resp., Tri-Township Transit
Avon Township	RideLakeCounty/West and In-House Demand Response
Benton Township	Pace Dial-a-Ride and taxi-cab coupons
Cuba Township	Pace Dial-a-Ride and taxi-cab coupons
Ela Township (Road District)	In-House Demand Response
Fremont Township	RideLakeCounty/Central and RideLakeCounty/West
Grant Township	RideLakeCounty/West, In-House Demand Resp., Tri-Township Transit
Lake Villa Township	RideLakeCounty/West and Tri-Township Transit
Libertyville Township	RideLakeCounty/Central and taxi-cab coupons
Moraine Township	In-House Demand Response and taxi-cab coupons
Shields Township	Type of Service: RideLakeCounty/Central
Vernon Township	Pace Dial-a-Ride and taxi-cab coupons
Warren Township	Pace Dial-a-Ride, In-House shuttle and taxi-cab coupons
Wauconda Township	RideLakeCounty/West and In-House Demand Response
Waukegan Township	In-House Demand Resp., Shopper shuttle and taxi-cab coupons
West Deerfield Township	In-House Demand Response and taxi-cab voucher
Zion Township	Pace Dial-a-Ride and taxi-cab coupons
Lake Forest/Lake Bluff Senior Center	Demand Response
Village of Deerfield	Subsidized taxi-cab coupons
City of Highland Park/Senior Bus	Fixed Route and taxi-cab coupons
Village of Riverwoods	Taxi-cab coupons
Village of Vernon Hills Senior Bus	Demand response and shopper shuttle

Source: Lake County website: <http://www.lakecountyil.gov/3529/Township-Community-Programs>.

5.3.2.4 Social Service Paratransit Programs

Paratransit services are also provided by social service agencies in the county. These Programs are sponsored or volunteer-based transportation service providers. Table 5-19 provides a list of social service paratransit programs.

Table 5-19. Lake County Social Service Paratransit Programs

Agency	Service
Advocate Good Shepherd Hospital	Pick up/drop off at Advocate Good Shepherd Hospital
Catholic Charities	Contracted transportation vender
Center for Enriched Living	Transportation for members who participate in the Center's activities
Countryside Assoc. for People with Disabilities	Transportation services for clients of Countryside Association
ElderCARE at Christ Church	Escorted door-to-door volunteer service
Home Instead Senior Care	Incidental transportation through caregivers
Independence Center	Transportation for registered clients of the Center who live in Waukegan
Lambs Farm	Transportation services are provided only to clients of Lambs Farm
SE Lake County Faith in Action	Volunteer Drivers
Warren Special Recreation Association	Shuttle Bus at designated locations; offered to registered participants

Source: Lake County website: <http://www.lakecountyil.gov/3530/Social-Services-Programs>.

5.3.2.5 Lake County Transportation Coordinated Transportation Services Committee

The Lake County Transportation Coordinated Transportation Services Committee (LCCTSC) is an active group of government officials, service providers and advocacy groups focused on facilitating the implementation of coordinated, efficient, reliable and affordable public transportation throughout Lake County. The LCCTSC's emphasis is on improving transportation for persons with disabilities or medical challenges, the elderly, low income residents and those in need of transportation for access to employment. The Committee meets on a quarterly basis.

The LCCTSC is defining an overall direction of transportation services in Lake County, to include:

- Fostering coordination and improving transit and transportation services for seniors and persons with medical needs or disabilities, persons with work transportation needs, and the low-income population.
- Helping transportation providers identify needs, eliminate duplication of services, find solutions and redistribute funds in order to better serve the needs of the community at large,
- Providing central access to information and options that are coordinated, affordable and borderless within Lake County.

5.3.3 Pace Vanpool Programs

Pace operates one of the largest vanpool programs in the country. Pace reported that for 2018, 567 vanpools transported 1.5 million passenger trips, which generated \$2.5 million in fare revenue (FTA National Transit Database). Under the banner Vanpool Incentive Program (VIP), several different vanpool options are available, including:

- **Traditional Vanpool** | Designed to transport a group of 5-13 people to work in a Pace Van, employees who live and work near one another and share similar schedules can form a group to travel between home and work. Each rider pays a monthly fare based on distance and number of participants. One of the participants volunteers to be the primary driver, who does not pay a fare and also receives 300 personal miles a month. Backup drivers receive a \$10 per month discount.
- **Employer Shuttle** | The program supplies vans to employers, who in turn provide the drivers and pay a monthly fee to Pace to transport workers from area transit centers to work sites. A \$600 monthly fee covers the use of the vehicle, gas, maintenance, and insurance. The employer provides the driver of the vehicle and has the option of charging the employees a fee for the transportation service.

- **Metra Feeders** | Allows a Pace van to be parked at a Metra station near the worksite so that 5-13 participants can take the train and then use the van to complete their commute. At least half of the participants must purchase a Metra monthly pass or 10-ride ticket. Each participant pays \$58 per month, which covers all operating costs associated with the van. Metra fares and parking are not included in this rate. Parking is subject to availability. Parking overnight requires approval and in most cases a permit from the local municipality.
- **Advantage Van** | Designed for non-profit organizations, this program helps transport employees or clients to a work location. The Advantage Program is available to not-for-profit human service organizations or agencies located in the Pace six-county region that hold a current State of Illinois Developmental Training Certification or equivalent. It provides work-related transportation service to persons with disabilities at the rate of \$250 per month per van. The agency is required to provide and maintain insurance.

Participants of Pace's Vanpools program are eligible to use a Guaranteed Ride Home program, allowing reimbursement of up to \$125/year for alternative transportation taken due to a personal emergency.

Relevant 2017 data on vanpools serving Lake County work locations is provided on Table 5-20.

Table 5-20. Pace VIP Vanpools to Lake Cook Work Locations (2017)

Company/Destination	Location	Number of Vans
Abbott Laboratories	Abbott Park	6
Aon Risk Services	Lincolnshire	3
Baxter Healthcare Corporation	Deerfield	3
Continental Automotive Systems	Deer Park	2
Dean Witter, Discover Financial	Riverwoods	14
Hospira	Lake Forest	1
Army Headquarters—USMEPCOM	North Chicago	4
Naval Supply—Great Lakes	Great Lakes	2
Peer Bearing Company	Waukegan	1
Trustmark Insurance	Lake Forest	1
Veterans Administration	North Chicago	21

Source: Paratransit Market Study for the Lake County Region, LCDOT, April 2019.

5.3.4 Pace RideShare Program

Pace is the designated Public RideShare Administrator for northeastern Illinois. Pace RideShare can help commuters join or create a rideshare commute. The program involves registering online to create an account (<https://www.pacerideshare.com/rp2/signup>). Commuting parameters (e.g., origin, destination, and schedule) are used to identify potential carpool partners. Pace promotes the program directly to employers, and assists companies in preparing Commuter Programs to encourage employees to commute by methods other than drive alone.

5.3.5 Pace Initiatives

Pace has plans to modernize suburban public transportation in northeastern Illinois by implementing a 24-line rapid transit network in the Chicagoland region. This service will enhance mobility and suburb-to-suburb travel options. The first line, Milwaukee Avenue, began service in August 2019, operating in north Cook County. Pace's Pulse Arterial Bus Rapid Transit Corridor Development Plan includes three tiers of projects: Near-Term, Mid-Term and Long-Term. Lake County includes the following Long-Term Pulse Routes:

- **IL Highway 120:** I-294 to City of McHenry
- **Milwaukee Avenue:** IL Highway 68 to IL Highway 120
- **US Highway 12:** Dempster Street to Wauconda
- **IL Highway 59:** US Highway 30 (Will County) to IL Highway 22 to US Highway 12

Additional information on Pace plans will be provided in its updated strategic vision plan, *Driving Innovation*. The Plan is expected to be released in late 2020.

5.4 NON-MOTORIZED

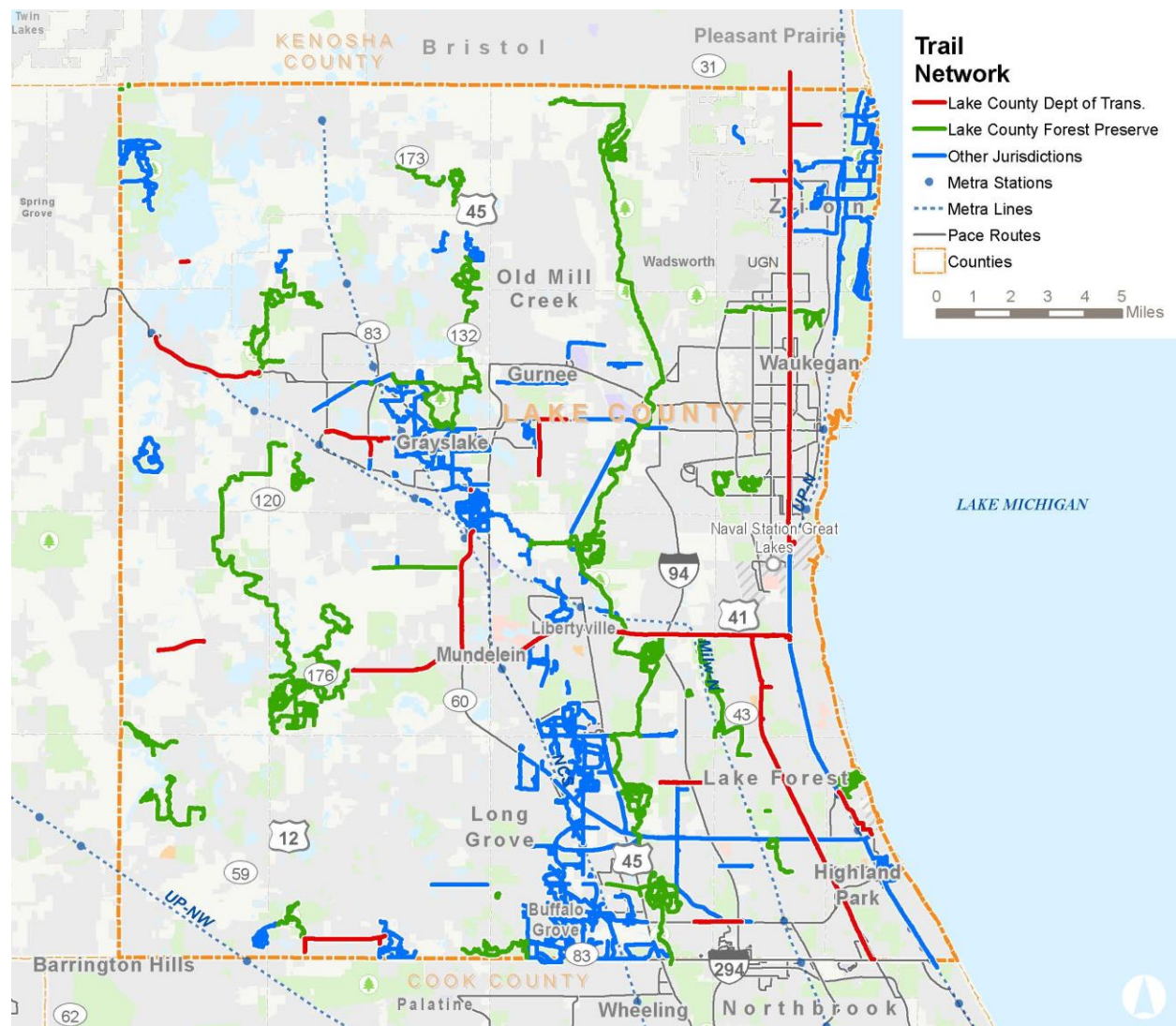
The Lake County 2040 Non-Motorized Transportation Plan, published in 2014, indicated that there were over 500 miles of public bicycle facilities throughout the County. These included off-street and on-street facilities. Off-street bike paths include paved asphalt and unpaved, crushed gravel surfaces. The network includes 150 miles identified as the trunk system, which serves as the backbone of the larger network.

The network facilities are under three primary jurisdictions:

- **Lake County DOT:** 48 miles of off-street paths and about 4 miles of on-street lanes.
- **Lake County Forest Preserve District:** Over 143 miles of multi-use trails, nearly all of which are off-street.
- **Other Jurisdictions:** Approximately 330 miles of public facilities are owned by municipalities, townships, or institutions (e.g., College of Lake County). The majority of these facilities are off-street paths, and many are used primarily for local residents within a limited geographic area and do not provide regional connections.

Figure 5-18 provides an overview of Lake County's trail network.

Figure 5-18. Lake County Trail Network



Source: Lake County.

In addition to the County's trail system, an equally important non-motorized asset is sidewalks. While bicycle paths/trails are largely intended for recreational purposes, sidewalks can provide a more comprehensive way of connecting residents to employment centers, for example. The presence of sidewalks can also serve as an important complement to transit, including last mile/first mile links.

A major information source for Lake County sidewalks is the CMAP Sidewalk Inventory, which documents the existence of sidewalks in the seven-county northeastern Illinois region. As shown in Figure 5-19, sidewalk networks are more complete in the developed parts of the County. In terms of comparison with other parts of the Chicago region, Lake County has a highest proportion of roads without sidewalks (60 percent) than any other county, except for McHenry (74 percent). For comparison, Will County has 52 percent without sidewalks and DuPage has 33 percent. Within Lake County itself, figures range from 32 percent of roadways without sidewalks in Moraine Township, near the border with Cook County, to over 90 percent in the townships of Cuba and Newport. See Figure 5-20 for more details.

Figure 5-19. CMAP Sidewalk Inventory

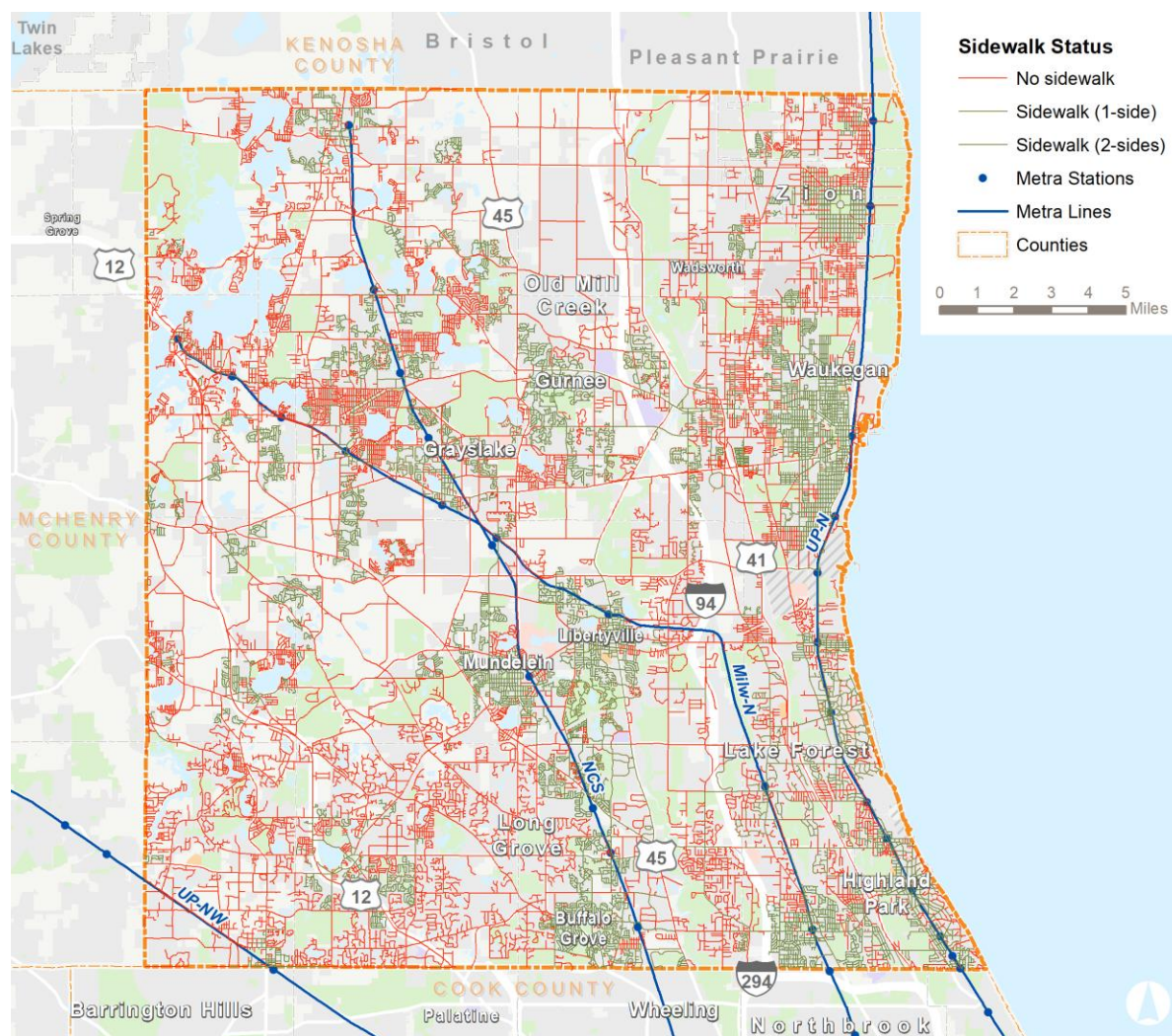
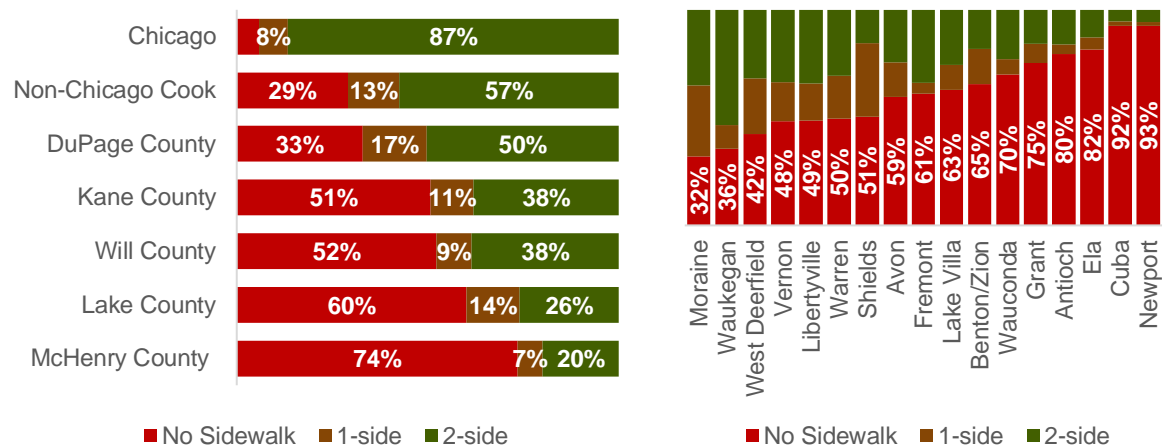


Figure 5-20. Percent of Roadways by Sidewalk Status (2018)



Source: CMAP

5.5 OTHER TRANSPORTATION

Other transportation services operating within Lake County are as follows:

- Amtrak:** Intercity passenger rail service operates through Lake County using the Metra MD-N/CP routes between Chicago and Milwaukee. However, there is no station in Lake County, with the nearest at Glenview in Cook County and Sturtevant in Racine County, WI. As part of a proposed upgrade to the Hiawatha route, there have been discussions of jointly using the Lake Forest Station for both Amtrak and Metra service.
- Transportation Network Companies (TNCs):** Also known as ridesharing or ride-hailing service companies, these firms match passengers with vehicles, using websites and mobile apps. Examples of TNCs serving Lake County include Uber and Lyft. These demand-driven ride-hailing services provide service coverage throughout Lake County.
- Taxi and Limousine Services:** A number of taxi/limo companies serve Lake County and provide another transportation resource to County residents, workers, and visitors. This method of transport is often used to access airports, for example, O'Hare International Airport or General Mitchell International Airport in Milwaukee. Also, as noted in the section on paratransit services, many townships and municipalities offer discounted taxi vouchers or coupons for eligible residents. Examples of taxi/limo companies serving Lake County include:
 - Curb Rider and Ride Arro:** An application for users to hail a taxi from their smartphone.
 - Go Safr:** A ride-sharing app aimed at providing options for women riders and drivers.
 - Hop Skip Drive:** A dependable transportation solution schools and families can use for children's transportation.
 - Wingz:** Riders can book a trip up to two months ahead of time, there's no surge pricing during busy periods, and riders can request a specific driver with whom they have a good relationship.
 - Fly Wheel:** Allows smartphone users to hail and pay for a traditional taxicab through the company's app. As with many other services, users can also schedule a ride ahead of time.
- Car Share:** Car rental for a short period of time is considered car sharing. Apart from the length of time of the rental, another difference is that private vehicle owners rather than companies may be the carsharing facilitators. Car sharing options such as Zipcar, Ride Hitch, and Turo are offered in Lake County.

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